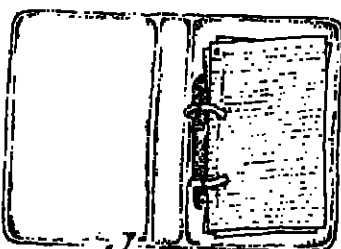


NIGERIA has failed to fulfil the praiseworthy aims of the national development plan for higher education. Leonard Bloom and Howard Woodhouse look at the problems (page 10)



In the first of a series on NEW DISCIPLINES, Brian Morton talks to Ian Kennedy, controversial holder of Britain's first university chair in medical law and ethics (page 11)

ANTI-SEMITISM is a vice most closely associated with Nazi Germany. Yet, as Douglas Johnson reveals, it has been, and remains, endemic to France as well, reaching its peak with the infamous Dreyfus case (page 13)

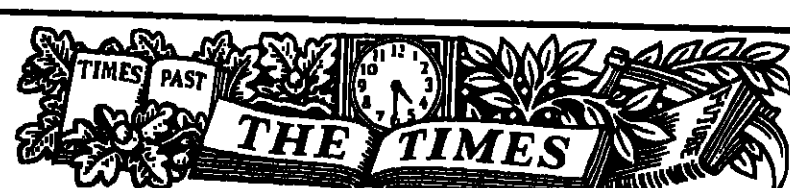
What happened to Henry Sidgwick's nineteenth century advocacy of a POLITICAL SCIENCE that was an actual, practical education in citizenship? Robert Wokler reviews a detailed study of British political thought (page 16)

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NEXT WEEK

Comparing the arts and sciences
Presences: Michael Schmidt on C. H. Sisson
Richard Burckhardt Jr on Alfred Russel Wallace: ideas of evolution

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The Great Debate

The wrong end of the stick

The present year may well be remembered as a moment like Robbins but without a Robbins report. The first part of this statement is difficult to dispute. During the next two years ministers will be faced with a series of decisions about the future of higher education as pregnant of long-lasting change as those taken by their predecessors 21 years ago. These decisions cannot be put off. A choice has to be made: is it to be "snobism", a sad unravelling of Robbins? or is there to be a more hopeful post-Robbins order, a brave new world of closer community and industrial links, continuing education and wider access, a final descent from the ivory tower?

Many, however, may object to the second part of the opening statement. They will point out that there is no lack of "great debates" at present. The Council for National Academic Awards started it all with its consultation on the future pattern of undergraduate courses. The National Advisory Body followed with its discussion paper on a strategy for local authority higher education in the late 1980s and beyond. Finally the University Grants Committee came in last autumn to cap them both with its own "great debate", the 28 questions contained in its November circular *Development of a Strategy for Higher Education into the 1990s*.

The title of the UGC circular reminds us when and where this whole process began, because it contains the same phrase used in the title of the now almost forgotten discussion document *Higher Education into the 1990s* published by the Department of Education and Science and the Scottish Education Department six years ago. For it was then when Mr Callaghan was still Prime Minister that the Robbins expansion lost its momentum, or perhaps better lost its direction.

The 1980s were going to be different. The tide had begun to turn against public spending; the prospect of an actual decline in students had appeared on the distant demographic horizon; and a vague sense of dissatisfaction was stirring that the great expansion and experiment of the immediate past had failed to produce the promised, although probably exaggerated, results. Higher education had come up against the limits of Robbins.

Not much has changed. That is still the background to the present disjunct "great debates", as it was to all intervening policy initiatives like the Leverhulme inquiry. In one sense we have been engaged about the future of higher education for the best six years. The difference today is that the debate is now near its closure. It has all begun to happen. The prejudice against higher public spending is now a flood; the danger of demographic decline has moved from the far horizon to the middle distance; and the dominant vision of the 1960s and 1970s has been irrevocably broken by the powerful raids of politicians, civil servants and industrialists into academic territory.

We may need another Robbins report but we are not going to get one. The only available focus for informed and sustained debate is the UGC's November circular. It and the NAB and CNAAG documents are the only instruments that can be used to influence, steer, or possibly deflect the incremental prejudices of ministers and officials which are inexorably constructing higher education's post-Robbins mould. Whatever its shortcomings, this interlocked "great debate" must be taken very seriously.

For this reason this space will be devoted for the next four weeks to the UGC's 28 questions, plus a few from the NAB and the CNAAG. This week we examine the immediate issues: future student numbers and the money to pay for teaching them and conducting research. Next week the focus will be on issues of structure: the future of

the academic profession including tenure and "new blood", and the evolving shape of the university system. On March 23 we will concentrate on the academic dimension: research, osals, finally on March 30, conveniently the day before the UGC's final deadline, an attempt will be made to sum up and to elaborate the sketchy points made in this brief introduction: the debate that should have been maybe?

Most people think the heart of the UGC's "great debate" is to be found in the compulsory questions, numbers one to three which cover resources, student numbers and so the all-important unit of resource, and number 13 of UGC itself does not necessarily agree. In a sense the committee has to disagree. For to accept the convention that resources determine what is possible in higher education would come close to denying the need for a fundamental debate. Such a debate can only be justified by the belief that to some degree the available resources will be influenced by what higher education appears to be able to offer in the late 1980s and 1990s.

In effect the UGC is inviting the universities to write a prospectus which will subsequently become the basis for negotiations with the Government. The present debate is an incitement to seize the initiative. This fresh and positive approach makes good sense for two reasons. First, no Government is ever again going to provide extra resources unless it is very clear what those resources are going to buy. The days when, to use the favourite phrase, the money was left on a tree stump will never return. Second, the present Government has a few vague notions about what it expects from higher education but few clear plans. It is hungry for plausible guidance.

In any case the difference between the rhythm of university development and the time horizon of public expenditure plans is so great that universities cannot hope for even approximate certainty about resources. This difference will increase not diminish. For universities are trying to push out their planning horizons after five, arguably ten, years of chaotic improvisation - process - while the Government's expenditure plans are becoming ever more tentative and provisional, subject to the random erosion of inflation because of cash limits and the opportunistic addition of special programmes like "new blood" and information technology.

All that can really safely be said about resources is that in general universities must expect sloping funding, partly because of this Government's general antipathy to public expenditure, partly because of the downward pressure exerted by the much lower unit costs in polytechnics and colleges. But the angle of the slope will vary a lot from university to university. This will be governed by many factors - the favour or disfavour of the UGC, subject balance, the detailed structure of costs in particular institutions, their entrepreneurial ability to launch on new initiatives both public and private.

Two reactions are possible to such chronic uncertainty. The first is to lose heart entirely and abandon any serious attempt at long-term planning. The second is to take some calculated risks and push ahead with new development in the hope that the resources will follow. What is probably not possible is to reduce the uncertainty by purging the will-of-the-wind of privatization. Only a handful of universities has any hope of raising serious sums of private money. In any case it is not clear that dependence on private money would be any more secure than the present dependence on public expenditure (except in the fantastic form of permanent multi-million

pound endowments). In the end privatization may be more significant in public relations than cash terms. The pressure to attract private money may sharpen universities' relations with their alumni, their local communities, and industry, but it is unlikely to produce any substantial change in how universities are funded.

If the debate is not about resources, at any rate in the first place, then it is about student numbers. This is the firm conclusion of almost everyone. Student numbers are widely regarded as the key that can unlock the Treasury's door. If the Department of Education and Science can be persuaded that its present student projections are too conservative, higher education can avoid further cuts and even make a strong case for extra resources. The Royal Society, the vice chancellors' committee and the Association of University Teachers have all produced rival, and more optimistic, projections of future demand.

This view is broadly correct but there are dangers in regarding such projections as a kind of philosopher's stone. After all the Government may accept that there will be more students but argue that they must be accommodated by lower unit costs, which is exactly what has happened in the last two years.

In any case four important qualifications need to be borne in mind. First, student numbers up to 1990 are not a contentious issue. Both the DES and its critics agree that the number of students will hold steady. The argument is about what happens next. But by then we will be in post-Thatcher Britain far beyond the most distant horizon of public expenditure plans. Second, the Royal Society, the CVCP and the AUT are all arguing about university numbers. Their coded message is "we will be all right but we don't know about those polytechnics." Yet any Government is going to insist that higher education numbers are considered in planning projections. The division between the two sectors will always be a political decision.

The final two qualifications are even more significant. The third is that manpower planning is certain to re-emerge as a powerful factor. Student numbers may have been pushed up in the 1960s and 1970s by demand from sixth formers and others, but they may have to stay up in the 1980s and 1990s because of the nation's growing need for an adequate supply of highly skilled labour. Even if demographic decline seems to condemn higher education to a substantial cut in its student population, that cut in the supply of graduates may be unacceptable.

The fourth qualification is the most important of all. There is a tendency to look at projections of future demand in a vacuum, as an essentially mechanistic operation governed by the differential birth rates in social classes and similar factors. This mistaken view appears to see student demand as something out there largely uninfluenced by the behaviour of higher education. Yet it is clear that in some crucial areas like continuing education demand is virtually a component of supply and in almost all areas it is a dynamic and malleable force. It is a dynamic and malleable force.

An even bigger mistake is to regard student demand as a neutral value-free factor in higher education planning. In fact as the UGC recognized in 1981 and the NAB recognizes today student numbers and the unit of resource have to be taken together. And discussion of the latter takes us right into the heart of the debate about the future character of higher education, whether a tiered university system, with research universities centres of excellence at its apex or advanced further education much more substantially concentrated in large (polytechnic?) institutions.

Next week: post-Robbins mould?

Laurie Taylor



Dr Shadbolt, I wonder if you'd be good enough to read out the opening question. Certainly, sir.

Together with the controversy punctuation. Of course. This is Question 7 on the Nineteenth Century Popular Culture paper. Inverted Commas.

Single or double? Erm... double.

Could be critical. On we go. Yes. Double Inverted Commas, like Capital. The typical function of esoteric cultures within Victorian popular theatre was to provide an opportunity...

Is there much more of this, Dr Shadbolt? Just a little... erm... to provide an opportunity for the spillover loosening of moral imperatives which might have been tolerated within more domestic settings.

Mmmm. Well, is that it? Not quite. The inverted commas after "domestic settings", and the "discuss with reference to the courtship of, capital, Nanki, hyphen, Poo, and, capital, Yum, hyphen, Yum".

I take it that "Poo" and "Yum" are also capitalized. Yes indeed. Both "Poo" and "Yum" although perhaps for clarity I should say both "Yums".

Quite. Well, there seem to be several points of interpretation which might be raised by this question, but as you all know this Examination Papers Sub-committee may not address itself in any way to content but only to formal grammatical features, and it is on this aspect that I understand Dr Rackstraw wishes to speak.

Thank you. The problem that I wish to bring to the subcommittee's attention is that this quotation on Dr Bunthorne's paper turns out not to be a quotation from an external source but a quotation, if that is the word, from Dr Bunthorne himself. This does seem to me to raise the important question of whether or not it should be placed within quotation marks.

Thank you, Dr Rackstraw. Fortunately though, we have a set of procedures which take care of this situation. First, can we establish whether or not Dr Bunthorne simply invented this convoluted sentence for the examination paper - in which case quotation marks are explicitly excluded - or whether it was taken from written material produced for another occasion. He claims to have written it nearly two years ago.

I see. Then, under Rule 6(2) it is technically a quotation and qualifies for inverted commas. But he tells me also, that the paper in which the statement was included has not been published.

Will it be published before the date of the actual examination? It seems unlikely, sir.

Then under 6(2) iii, only single quotation marks are in order. Is that perfectly clear to everyone? Good. Now we can turn to item eight on the agenda, *Nineteenth Century Popular Culture*, and the problem raised by the use of single quotation marks in the question. Critically examine the demystification of gender differentiation implicit in the recent work of Boy George. Yes, Professor Pewd.

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MAKING HEADLINES: If you want to get ahead get a hat - varied headgear among students who braved the cold for a rally for youth in London's Battersea Park last weekend. Pictures by David Hodge.

No more cash, no innovation, say research chiefs

by Jon Turney
Science Correspondent

The five research councils are to tell the Government there is no way they can support new developments without an increase in the budget for science.

A confidential paper prepared for the Advisory Board for the Research Councils by the heads of research councils shows them united in their rejection of Secretary of State for Education and Science Sir Keith Joseph's suggestion last year that new scientific opportunities could be pursued by redeploying existing resources.

The heads of research councils' paper says that if the Science Vote does not increase, they will have to manage a steady reduction in research support over the next few years because present "level funding" takes no account of rising equipment costs and underestimates inflation.

The research councils are still smarting from the Government's rejection of their bids for new projects last year - amounting to £27m on top of the £500m Science Vote. The only extra money granted for 1984/85 was for rising costs of subscriptions to international laboratories caused by the weakness of the pound.

The paper quotes Sir Keith Joseph's response to last year's proposals; that there was no doubt of the importance of new science, but "more might be done within the present large total for the Science Budget to fund these new requirements through greater efficiency and by withdrawing from areas of lower priority".

The new paper for ABRC denies this is possible, and repeats all last year's bids. The research councils want:

- £24.5m for university grants
- £23.2m for factory automation research
- £23.3m for a new inter-research council initiative in biotechnology, concentrating on microbial physiology and plant molecular biology
- £500,000 for food and nutrition research
- £2.5m for work in the neurosciences, medical aspects of nutrition and diagnostic imaging
- £3.3m for remote sensing and other environmental science
- £11.1m for a new space project for X-ray astronomy

These figures are for 1985/86, and the proposed expenditures all increase over the next two years. The rest of the bids are for restructuring of council institutes, superannuation, unmet costs of international subscriptions and a new international project for deep

'Too little time' for teacher review

by Patricia Santinelli
and Karen Gold

The teacher education review which the National Advisory Body committee and board decided to carry out by this summer has run into serious opposition.

Members of the two NAB policy groups involved in the review - the teacher education group and the chairman's study group - have both told board chairman Mr Christopher Ball that the review cannot be carried out properly in the time.

At a heated meeting of the two groups, Mr Ball told members that if they were not prepared to carry out NAB committee instructions and timescale, they should consider their position. "If members feel they can't serve under those conditions, then they shouldn't serve on the subject groups," he said this week.

At its spring council this week, the Council for National Academic Awards agreed not to provide factual

information on teacher education courses it validated by the April 19 deadline set by the NAB. The NAB had asked the council to provide details of courses and their interdependence with non-teacher education courses in the same institution, and to provide advice on quality later.

According to CNAAG chief officer Dr Edwin Kerr, the council did not refuse to provide quality advice but it had told NAB that much more work needed to be done on defining quality before it could cooperate, and that institutions should be asked for the facts directly by NAB.

Mr Ball said that CNAAG's refusal did not threaten the exercise: Her Majesty's Inspectorate had agreed to provide information, and the NAB, which already had substantial data on some institutions, would approach colleges directly.

The NAB board and committee had asked the working group to review teacher education for 1985, which meant doing it for the July 1984

committee meeting, he said. "It was decided at the meeting we should do the work first and see what it looked like. If we felt unduly rushed, then our reports should say so."

Members of the teacher education group have argued that the exercise could be preemptive and lead to erroneous judgment of many institutions which would be best considered when it begins its own major review of the whole public sector teacher training system at the end of this year.

The group is concerned both about the lack of information available and the inaccuracy of some of this information on the size and distribution of places and subjects, particularly with regard to the voluntary colleges.

Some members are also worried about the limited number of institutions involved, chosen because they are smaller rather than what they do. A figure of 20 institutions has been floated, as well as figures of 1,000 full time equivalent students as representing institutional viability.

Employers expected to take tough line on pay

by David Jobbins

Local authority employers are to take a tough line today when negotiations with leaders of the college lecturers open over the 1984 salary claim.

They are expected to make clear to union negotiators that they are no more receptive to the demand for automatic transfer from the lowest salary grade this year than when they turned it down last year.

They are also adamant that money for salaries is tight and that the 4.5 per cent likely to be accepted by local government manual workers is far in excess of what they can offer. Any offer made today to college lecturers is likely to be in line with what emerges from this week's negotiations with schoolteachers, who have already rejected 3 per cent as insulting.

The lecturers are claiming an as yet unspecified percentage increase as well as automatic transfer from the Lecturer 1 to Lecturer 2 scale.

Negotiators representing 34,000 university academic staff met more sympathy for their case than their counterparts in further and higher education. Instructing its members in Gwent to strike for a day on March 28 at plans by the Labour controlled authority to increase the contact hours of all its L1s and L2s to the maximum permitted under a national agreement.

Ms Diana Warwick, general secretary of the Association of University Teachers, said after a four hour meeting of committee A, the first stage in the negotiating machinery, that the employers acknowledged the problems for recruitment, retention and motivation of university staff when they fell behind but felt constrained by cash limits.

In addition to new demands for computer and research staff, the union is seeking a solution to the promotion blockage at the top of the scale. Local authority employers last week discussed their long term attitudes to salaries and conditions of service, and their general desire for greater flexibility and competitiveness will colour today's negotiations.

Among issues they are likely to want to press in the longer term are concessions over greater class contact hours and an extended academic year. Lecturers are already under pressure to accept greater class contact. The National Association of Teachers in Further and Higher Education is instructing its members in Gwent to strike for a day on March 28 at plans by the Labour controlled authority to increase the contact hours of all its L1s and L2s to the maximum permitted under a national agreement.



The great publications race, 13

Redundant lecturers' unit appeals to 'youngsters'

More than 30 per cent of academics making use of a unit set up by the vice chancellors to aid redundant lecturers are under 50 and around 15 per cent are in their twenties and thirties.

The Manchester-based Universities Reemployment Unit was set up at the end of 1982 to help people seeking employment outside British universities. However, its secretariat has

adopted a more flexible response by including academics other than those taking early retirement, such as those reaching the end of fixed term contracts.

The unit was closely tied to the temporary compensation scheme which expires in July and was originally intended as a short term measure. A decision on whether to wind it up or

continue its work in a modified form is to be taken by the Committee of Vice Chancellors and Principals at the end of this month.

At the moment, the unit lists 91 academics looking for alternative employment or consultancy work. The first list drawn up was circulated to 31 prospective employers and some 200 people have either found work or

remain on the books. Many are interested in the prospect of work overseas, including atomic physicists, biochemists, chemical engineers and a philosophy lecturer, who at 43 is looking for a clean break from academic life.

Of the 91, 16 are aged over 60 with the largest single group (of 30) in the 35 to 39 age group.

Letters to the editor

Library formula does not add up to success

Sir, - I was delighted to read the comments by Derek Law on the formula for funding an academic library (Letters, March 9). I agree with everything he says about the original formula, which is simplistic rather than merely simple; but, sadly, I must take issue with his suggestion that a solution to the problem lies in adherence to the Parry Committee's recommendation that 6 per cent of a university's income should be devoted to library purposes.

This might improve the situation for a time in Edinburgh or in other large institutions, where there are significant economies of scale; but - *crede experto* - over a longer period, or in smaller universities, such a proportion, generous though it is by current standards, would not lead to salvation. The University of St Andrews has for a number of years allocated not less than 5.6 per cent of its budget to the library, compared to the UK median figure of 4.5 per cent. (*University Library Expenditure Statistics*, SCOUNL, 1983); nevertheless it finds increasingly that its ability to purchase the books and periodicals which are needed to support teaching and (especially) research is constantly being eroded. The reason is simple: with every university under constant pressure to make further economies each year, the library is unlikely to receive a higher allowance for inflation than that which the University Grants Committee includes in

the institution's block grant. For the 1983/84 this was at most 5 per cent nationally; so a typical library grant may well be 5 per cent greater this year than last year. At the same time we know that the rate of inflation in periodical subscriptions is currently over 20 per cent, and the rate for periodicals and books together over 15 per cent (*Index of University Costs*, officially prepared by the Committee of Vice-Chancellors and Principals). Simple arithmetic will demonstrate that despite all claims of "level funding" our library recurrent grant has effectively been cut by about 10 per cent; that if we have received the same proportion of our university's expenditure over the last three years of the "cuts" (and it makes no difference whether this proportion is Parry's 6 per cent, the national median of 4.5 per cent, or some lower figure) our actual purchasing power has already fallen by about one third; and that there is little prospect of significant improvement in the foreseeable future. Quite simply, we face the unhappy prospect of cutting our purchases by 10 per cent each year, even if our university is beginning to look increasingly optimistic.

Four times since the summer of 1981 the UGC has urged universities to preserve the purchasing power of their libraries. We, the librarians, have done everything in our power to economize

in the non-purchasing side of our budgets, even at a time when our professional instincts and government have been urging a necessary investment in new technology, so that the best use may be made of the huge capital investment that a library represents. In spite of all our efforts, we cannot keep up with library inflation: it is surely time for the UGC to recognize the facts and, somehow, to see that we receive the annual cash increases we must have before we can implement their declared policy.

A G MACKENZIE,
Librarian,
University of St Andrews.

Sir, - Librarians in universities have for decades been using formulae with more or less success in an attempt to allocate funds between subjects and users in a way which fairly reflects needs. The literature (mostly American) on the topic includes references to formulae which incorporate as many as 50 or more factors.

By contrast the formula from Emsley and Jenkins (*THESE*, February 17) has the considerable merit of simplicity. But perhaps it is too simple. It ignores the fact that staff and postgraduates borrow books, and that undergraduates use periodicals. At Bath, available data suggest that postgraduates borrow as many books per head as undergraduates, and staff

borrow at least half as many. Figures on the use of periodicals are imperfect, but they in turn suggest that undergraduates account for at least 20 per cent and possibly as much as 40 per cent of the use of periodicals. A formula for use at Bath would clearly have to take these factors into account, although elsewhere they may be of less significance (which I doubt).

University finance committees up and down the country may be easily persuaded to adopt a formula such as Emsley's and Jenkins's for its very simplicity, but also because it can be used to justify only minimal funding. But university librarians, in defending their share of the cake, need a more robust tool, a formula which reflects the real complexity of patterns of need and use. It may be that it is possible to produce a workable formula which does this and is flexible enough to be used by any university library if desired (perhaps a body such as Loughborough University's Centre for Library and Information Management could work on producing one). In the meantime, however, Emsley and Jenkins would probably agree that each university, if it wants a formula, needs to construct its own, reflecting the complexity of the local situation.

Yours faithfully,
K. E. JONES,
Deputy Librarian,
University of Bath.

Cape Town sincerity

Sir, - Christopher Forsyth (*THESE*, February 24) has argued that if the University of Cape Town is sincere about being an "open" university, it will have to come to terms with two important problems. First, there are not many "financially able and academically qualified black students"; and, second, the university's selective admissions policy is under siege from people "who would like to see the adoption of some form of 'affirmative action' taken to favour black students".

Both problems are real; but the debate does not lie where Forsyth suggests that it does. First, the vice-chancellor of UCT, Dr Stuart J. Sanders, has declared that no student who is admitted to the university on academic grounds will be turned away because he or she cannot pay their tuition fee. In other words, UCT admits students, not only without regard to their gender, their racial classification by law, or their religion, but also without regard to their financial ability. Second, although UCT is convinced that the black education systems, and therefore the black matriculation systems, are in fact equal, for admission purposes, it treats the matriculation symbols (or marks) of white students and black students as equivalent.

In other words, "affirmative action" in favour of black students already exists; and no student who is academically qualified will be turned away because he or she is unable to raise their tuition fees. This does not mean that the problem has been solved. Students have expenses in addition to their tuition fees, and there is a great deal of debate about whether or not the form of "affirmative action" which UCT practices is substantial enough. As a matter of fact, therefore, the controversy which exists is not about whether or not we should do something about the two problems that Forsyth identified; it is about whether or not what we are doing is sufficient.

And this debate, unfortunately, must be constrained by what is financially possible and by what UCT can do to raise donations for its bursary schemes and its academic support programmes.

Yours faithfully,
DR JAMES MOULDER,
Special Assistant to the Vice-Chancellor,
University of Cape Town.

Staff rush to leave NELP

by Karen Gold

So many academic staff at North East London Polytechnic have rushed to take voluntary redundancy and early retirement that the none of the predicted 100-plus compulsory redundancies will now be needed.

Since NELP's director Mr Gerry Fowler declared a state of redundancy in the polytechnic last month, 89 people have applied to go, with more applications still coming in. Of the applications, 82 have been agreed; 74 of them for premature retirement and another eight for voluntary severance. At least 64 are to go at the end of this month.

The three local education authorities which support NELP - Barking, Newham and Waltham Forest - have also agreed to increase their topping up this year from £750,000 to £1m between them. With 20 more polytechnic staff going on secondment for a year, those changes mean that Mr Fowler's predicted £2m shortfall will

now be met, and the approximate 115 redundancies for this year will be unnecessary.

But the local authorities have said they want to bring their topping up contribution down to zero as soon as possible, and Mr Fowler has said that 200 jobs would have to go altogether by 1986 in order to bring the polytechnic's staff student ratios to national averages.

The educational consequences of losing 64 - more than 10 per cent - of the polytechnic's 630 staff in the middle of the academic year were described by the National Association of Teachers in Further and Higher Education as disastrous.

The distribution of staff leaving is as follows: eleven from arts and social science; nine from business studies; twenty from engineering; eight from education; three from the polytechnic's administration.

Ten are also to go from the Anglian Regional Management Centre at Danbury, which Essex County Council is

expected to take over from September 1985. Essex's further education and youth sub-committee is to recommend to the authority's education committee to accept a notice from NELP that the polytechnic does not want to continue running the centre from next summer.

The centre belonged to Essex in the early 1970s, and the county council is expected to pledge to take all the action necessary to keep management education running there and to retain existing courses.

According to Mr Fowler, the polytechnic is satisfied that all of these staff can be released without substantial damage to the academic fabric of the polytechnic. "We are reconsidering the details of our course provision in order to ensure that the high standard of education we provide is universally maintained," he said.

● The Council for National Academic Awards is to visit NELP for the final stage in the polytechnic's quinquennial review next week.

Annan spells out vision of elitism

by Ngao Crequer and Maggie Richards

The polytechnics should teach only strictly vocational courses and further education colleges should not teach degrees at all, according to Lord Annan, former vice-chancellor of London University.

In a speech he was due to give at the House of Lords this week, moving a debate on the need for change in higher education, he said that standards could only be maintained by acknowledging that there were different kinds of institutions and they did different things.

"We should formally acknowledge that eight of our universities contain so many top departments that they are acknowledged internationally as great centres of excellence; and, if I challenged, I am perfectly ready to name them."

He looked forward to the day when polytechnics were no longer "artefacts". "All their courses should be strictly vocational. Should there really be departments of philosophy in polytechnics? Should a single further education college teach for a degree? Surely not."

He also said it had long been a scandal that lecturers aged about 25 were given tenure two and a half years after appointment until they were 65. "Should not the universities be told that there will be difficulty in granting money for 'new blood' posts or for amendments proposed to charter and statutes, unless major changes in job security are introduced to the satisfaction of Parliament?"

One of the problems was that governing bodies did not govern. "The governance of the polys is sometimes subject to disgraceful political bias, and requires investigation. In the case of the Polytechnic of North London I think it would have been more revealing if the Secretary of State had investigated its governing body rather than its department of sociology."

Lay members should also form the substantial majority on governing bodies.

Lord Flowers, chairman of the Committee of Vice-Chancellors and Principals, was due to say that the scholarship is a long and painful business, and that is why we sometimes react less rapidly than some would like. Retired vice-chancellors, I have noticed, can be particularly impatient.

It was still not too late for the Government to affirm its belief in the importance of highly educated and well prepared citizens reaching their potential, but Government policies to reduce entry by one in seven was a strange way to do it, he said.

Lord Perry of Walton, the former vice-chancellor of the Open University, strongly criticized the Government's cut in finance to the OU.

With its totally different system to the conventional universities it was "economic nonsense" to impose strictures on student numbers. Cutting back on courses would impair their quality, and reduce the budget for broadcasting by £1.4m meant that valuable capital assets remained unused.

● The Nigerian system

Sir, - Your publication of the article on the Nigerian university and college system (*THESE*, March 9), with its facile generalizations and the arrogance inherent in their presentation, appals me.

Omission of your usual indication of the status and specialization of an article's authors, robs the reader unfamiliar with the Nigerian system of any indication of the weight of experience (or relative lack of it) behind the article.

Yours faithfully,
S. M. DUROAJIYE,
University College, Cardiff.



Evening of rhythm and blues

Ekome, the Afro Caribbean dance and drum group, whose name means unity, provided some welcome after-dinner entertainment for principals of the Association of Voluntary Colleges. The AVC was holding its annual meeting at King Alfred's College to mark the forthcoming retirement of Mr Marjorie Rose, principal of the college for 17 years.

Principals had earlier heard the Voluntary Sector College Council, the body designed to facilitate their entry into the National Adv-

isory Body, would become operational by the summer.

But they were most concerned about the way the voluntary colleges would be judged in the current NAB college review on the basis of three criteria - access, economy and quality.

They stressed that access must be interpreted as accessibility or good geographical distribution of institutions. If there was conflict between access and economy, it was felt that access should get priority.

OU students cost £4,000 less

The cost of educating a student to graduate level at the Open University is some £4,000 less than at a conventional university or polytechnic and the OU is now producing about one in eleven of first degree graduates.

The figures were cited by the OU's vice-chancellor, Dr John Horlock, when reviewing the university's progress over the last 15 years in a paper presented to the Manchester Statistical Society.

He went on to urge that the OU resources, amassed by 15 years of Government investment, should now be harnessed to benefit the nation.

The university's future would depend on three factors: its achievements and reputation; its present and potential contribution to the British economy and culture; and its cost effectiveness.

Dr Horlock spoke of a steady

graduation rate at the OU of over 6,000 a year. But he noted that during the past three years since the Government doubling of OU fees, the university had to offer more places to achieve its target of about 20,000 new entrants because of a higher decline rate of offers.

In its non-degreed continuing education programme the OU had attracted 41,000 "students" last year. More than 12,000 enrolled on short courses with the university; 7,000-plus had joined as associate students, taking isolated units of the undergraduate programme; and nearly 22,000 had purchased the university's special teaching packs.

The calculations revealed costs per arts equivalent graduate of £11,541 for the conventional university students; £11,786 for the student in the public sector; and figures of £7,054 or £7,157 for the OU student.

Departments bring out own guide after row

by John O'Leary

Two Government departments are to bring out their own higher education guide underlining the variations in job prospects between different subjects, in spite of strong opposition from careers advisers and some senior academics.

The Association of Graduate Careers Advisory Services withdrew from a project to produce a joint publication with the departments after a series of disagreement over content. Its officials feared that prospective students were being steered towards possibly unsuitable courses and that unemployment trends would be exaggerated.

But the Department of Employment and the Department of Education and Science are going ahead with plans to publish a booklet after Easter in which they will draw attention to individual subjects with a record of high graduate unemployment.

A new method calculating unemployment rates, discounting those who go on to further study, will produce some alarming statistics. Zoology, for example, will be shown to have up to 60 per cent of former students without jobs six months after graduation.

The booklet will go into detail on 35

subjects and comment on why such differences exist between the various disciplines. It will also point out that graduates in many of the subjects with the highest unemployment rates also tend to be forced into lower level jobs or those unrelated to their degrees.

In contrast, the AGCAS survey *What do graduates do?*, which was published last week, deliberately shies away from such judgments and stresses that its statistics should be treated with caution. In particular, AGCAS officials believe that its unemployment rates, calculated so soon after graduation, mask a much better long-term position.

The AGCAS survey was eventually sponsored by the careered accountants' *Touche Ross*, following the earlier withdrawal of the Manpower Services Commission's career and occupational information centre.

Its editor, Mr George Buckton, of Plymouth Polytechnic, said: "When you have had someone in your office, as I have, who tells you after two years on an engineering course that he was never interested in it and he wants to go into the church, you realise that job prospects are not always the most important consideration in choosing a course."

Graduate Jobs, page 12

Rescue campaign intensifies

The campaign to save Heriot-Watt university's pharmacy department has intensified as the University Grants Committee prepares to make its final decision next week.

Last month, the UGC told its panel on studies allied to medicine, which had earmarked the pharmacy school for closure, to prepare a new report, but it is understood this too proposes closing the school.

Now Lord James Douglas Hamilton, Tory MP for Edinburgh West, is seeking an adjournment debate on the issue, and an all-party group of MPs are seeking urgent talks with UGC chairman Sir Peter Swinerton-Dyer.

They will argue that pharmacy is very much a regional profession, and that local health care will suffer if the school is closed. They will also remind Sir Peter of his recent remarks that the school systems made it very difficult for Scottish students to enter English institutions, and therefore Scots would be disadvantaged even if intakes to English pharmacy schools were increased.

The Association of University Teachers claims that Sir Peter said the decision had not been taken on financial grounds, but MPs reported that Mr Peter Brooke, under secretary of state for education, had said a substantial factor was the £1m cost of moving pharmacy to Heriot-Watt's new campus.

A large number of other bodies, however, have also condemned the proposed closure.

● **New bishop**

Professor David Jenkins, head of the department of theological and religious studies at Leeds University, was named this week as the next Bishop of Durham. He has been at the university for five years and is a former fellow, chaplain and preceptor of Queen's College, Oxford.

His predecessor, Professor J. I. Tinker, followed the same path, leaving to become Bishop of Bristol.



Exam secrets

Sir, - The Committee of Vice-Chancellors and Principals argues that students might become confused if guaranteed access to raw exam grades (*THESE*, February 24). In November, 1981, I was informed by the deputy registrar of Leeds University that I might not know whether my examiners considered my thesis to be "potentially of a standard to merit the award" of a PhD, as this information is confidential to the university. There are clearly NO limits to this absurd and pretentious secrecy and its continuance can only provoke concern that it is the universities themselves who are confused about how to do their job properly.

Yours faithfully,
FIONA MASTER,
RULES member,
68, Ash Road,
Leeds.

Sir, - Following upon Ngao Crequer's report on "Reform campaign aimed at university secrecy" (*THESE*, March 3) this paranoia against releasing information is extended to the Privy Council; when I and other postgraduates have invoked that appeal procedure to the Vice-Chancellor, we have been told that our complaints will be copied to the university concerned but we shall not be allowed to see the university's reply as the Visitor "will keep it confidential to himself (sic)".

The Privy Council places the universities above the law of the land in denying a complainant the right to hear any evidence given against him.

Yours faithfully,
ALISTAIR J. WILSON,
37 Derrymore Road,
Willesby,
North Humberside

Training hope

Sir, - It was disappointing to see the relatively low key and neutral way in which you treated the Science and Engineering Council's policy statement on resources for engineering education (*THESE*, March 2).

However well the service industries in this country are developed, a substantial decline in national prosperity can only be averted by continually improving the productivity and competitiveness of the manufacturing sector. This can only be achieved by an increase in the supply of highly trained engineers both at the professional and technician level. Already industry is experiencing difficulties in recruiting staff of this type with an adequate background in the new technologies.

Engineering departments in universities and polytechnics are handicapped in meeting this need because of the lack of proper resourcing.

The statement by the Engineering

Guiding hand

Sir, - We are editing a series of booklets which will be published by the Society for Research into Higher Education to help students work and learn more effectively in higher education. The subjects of the booklets, each costing less than £1, will cover lectures, seminars, projects, examinations, essays and personal tutoring. The booklet on lectures, for example, will include presentation techniques, note-taking, the use of handouts and reading lists. The one on examinations will include revision, relaxation, the analysis of questions, planning, and writing.

It is our hope that the material for this series will come from lecturers and students in higher education. Many staff development centres, academic departments and student unions

already produce guides which could be very useful to students and staff elsewhere. Our role will be to compile and publish, in a "house" style, the advice given in these guides. We shall of course give credit for all sources.

We should be grateful therefore if you could forward any relevant booklets, lists, and other handouts which are given to your students or staff. We should also be grateful for any other advice that you can offer.

Yours sincerely,
DAVID AVISON,
Computer Centre,
Gustin Green,
University of Aston,
Birmingham B4 7PA.

D. J. JACQUES,
Centre for Educational Development,
Hatfield Polytechnic,
Herts AL10 9AB.

Taken to task

Sir, - I write concerning your article "Taking justice to task" (*THESE*, March 2) by Olga Wojtas. It is a pity that Ms Wojtas did not manage to check her facts more securely. I am very pleased about developments in Edinburgh but they do not constitute a "unique move" nor is our centre limited to criminological studies as your article indicates. The Centre for Criminological and Socio-Legal Studies in Sheffield has been in existence for four years and conducts a broad range of research.

The original Centre for Criminological Studies formed in 1976 was extended to deal with philosophical, sociological and other issues in order to give us the broadest spread of any law faculty in Britain. I think our record indicates that our claims are

justified and indeed the Social Science Research Council and its successor the Economic and Social Research Council has shown its faith in our standards by awarding us at a constant level more studentships in socio-legal studies than is true for any other outlet in the country.

We wish Edinburgh well but feel a little disturbed that potential applicants for membership of the centre here might be deterred from approaching us in the belief, nurtured by your correspondent, that we had closed down. The announcement of our death is premature; we are alive, kicking and thriving.

Yours sincerely,
NORMAN LEWIS,
Director,
Centre for Criminological and Socio-Legal Studies,
University of Sheffield.

General way

Sir, - To Mr John Briggs' citation of Keele as in some measure meeting Professor Wilson's call for new foundations to a general approach should be added the example of Buckingham, few of whose honours schools are confined to a single subject and all of which require, in addition, the study of a modern foreign language and of a further supporting subject outside the student's main field of interest.

Yours faithfully,
ARTHUR POLLARD,
Sand Hall,
North Cave, Brough,
North Humberside.

Letters for publication should arrive by Tuesday morning. They should be as short as possible and written on one side of the paper. The editor reserves the right to cut or amend them if necessary.



French racism

Sir, - The French Communist Party (like the French people, from whom they stem) are not beyond reproach with regard to their attitudes and actions on racial issues. However, for the record, Douglas Johnson (*THESE*, March 9) might have noted that the party have subsequently acknowledged some of their own guilt in those ugly incidents involving North African immigrants in the Paris suburbs.

Professor Johnson's accusation that the French Communists "are guilty of a specific anti-Semitism, as illustrated by their constant hostility to Israel" raises a more general issue. Why should hostility - even constant hostility - to the policies and deeds of the Israeli government be automatically connoted with anti-Semitism?

Such hostility is not unique to the French Communist Party. It is manifested by most of the member states of the United Nations, by hundreds of thousands of Jews living in Israel, and by a majority of the Jewish people of the Middle East.

Surely there is enough anti-Semitism in the world without Professor Johnson inventing more of it?

Yours faithfully,
PETER AVIS,
46 Dayneside Place,
Brough.

DON'S DIARY

MONDAY

I leave a wet, cold and windy Newcastle late afternoon for Heathrow and an evening flight for Singapore. Excellent Qantas service. Their flight magazine stresses that one does not need much food since one is taking no exercise which advice they then proceed to contradict by keeping you well fed.

TUESDAY

The short day. We disembark at dawn in Bahrain for leg stretching. I meet a former Newcastle student of 10 years ago and his wife on the same flight. He was not one of our most distinguished students but one thought most likely to succeed. Obviously a correct judgment. One runs across Georges in all parts of the world but I have yet to cap meeting one of our students on top of Cologne Cathedral. We arrive at splendid Singapore Changi airport at dusk after 13 hour flight. Temperature 29°C and humid. First impressions of Singapore are very good. One feels at home being driven on the left with even the number plates being of British format.

WEDNESDAY

Recovery day and chance to be a tourist. First experience of shopping (no marked prices, bargain for everything). City coach tour to see National Museum jade collection, botanical gardens (terrace) and pensive making. Spend evening sorting slides for tomorrow's seminar.

THURSDAY

I am collected by host and taken to the National University of Singapore site at Kent Ridge outside the city. New university building projects are in progress everywhere including a new medical school. Singapore is doing exactly the opposite of what is happening in UK - expanding. There is an enviable, five-year plan for large science equipment and talk of possible short term contracts for early retirement UK staff. Chemistry is flourishing with 425 students in the first year, 250 in the second, and third and fourth year honours of about 30 each. Each of latter two years has two selected special honours students, high fliers, who get individual tuition. Seminar is attended by final honours students.

FRIDAY

Final sorting of slides for lecture which is at 13.00. Refreshments after my lecture in an air-conditioned theatre are served outside in the open; so hot and humid in contrast. I am returned to hotel by the laboratory superintendent through rush hour traffic. I am introduced to his daughter, who trains to teach English. Schools work a double shift because of shortage of school buildings. Two separate airbuses of MAS with change about every six weeks. It is not a good idea, children find it difficult to concentrate in the afternoon heat.

SATURDAY

Another chance to be a tourist. Coach tour to Jurong Bird Park. Rain on the way but the guide correctly predicts it will be fine there. Birds appear to be raring because of heat. Final stop is "Willow Pattern" Chinese garden landscaped from a swamp.

SUNDAY

To Malaysia. Collected from hotel in air-conditioned Mercedes for airport. Getting out of car, spectacles steam up to unable to sign driver's chit. Lockheed Airbus of MAS to Penang Island off Malayan Peninsula 500 miles north of Singapore. Taken in non-air-conditioned Peugeot from new airport with Malaysian style arched roof past freepoint buildings weaving past potholes, chickens and skinny cows, passing Universiti Sains

Malaysia, where I am to be tomorrow, to outskirts of capital, Georgetown, en route for tourist hotel region of Batu Ferringi (Portuguese Rocks, but often translated as Foreigners' Beach). Hotel is actually on beach in idyllic setting of white sands, azure blue sea, palm trees and blazing hot sun.

MONDAY

Limousine to Universiti Sains, which in fact teaches a larger range of subjects than its title of University of Science suggests. It feels more like home here with stories of 25 per cent cuts. As economy measure, air conditioning does not go on till 10.00, by which time it is already 28°C. First seminar is followed by lunch at Penang Sports Club. Tour excellently stocked University Library before main lecture at 15.00h. Strange to see all notices in library in Malay but all books are in English. Lectures have been in Malay since two years ago, but as yet few chemistry books are bilingual anyway. There are a few research students; those that do higher degrees are keen to enhance their job opportunities by working on projects of national interest: palm oil, rubber, tin.

TUESDAY

Self-service breakfast again on the beach at the hotel. A morning off for sightseeing. Book on a coach tour of Georgetown but find it is operated by limousine since there are only two other people. These turn out to be a couple on a three-centre Far East holiday, who originally hailed from South Shields! We visit Fort Cornwallis, the Museum, a Chinese Clan House, a Buddhist temple and botanical gardens. Back to USM by taxi in afternoon for last seminar.

WEDNESDAY

Get to airport far too early for flight to Kuala Lumpur. Heat and humidity greater there than on coast where there are sea breezes. I am taken to University House, where I am to stay, then for a quick tour of Chemistry before first seminar mid-afternoon.

THURSDAY

My host provides a personally conducted city tour. KL has high-rise buildings like Singapore, as befits a capital city, unlike Georgetown, which has one, as yet unfinished. KL has an automobile-induced smog problem at rush hours. We visit the Selangor Club, War Memorial and National Museum. Malaysia still retains signs of British influence. There was anger at the raising of overseas student fees in UK, surely a short-sighted policy if ever there was one, and an anti-buy-British campaign was mounted. A few years ago 80 per cent of cars were British, now are Japanese except for prestige BMWs, Merces and Volvos. My lecture is at 17.30 with presentation of medal first, and I have hardly uttered two sentences before projector light goes out. Not a bulb but a power failure in half of building. Concern and embarrassment of hosts while awaiting summoned electrician. Eventually we restart half an hour later in non-air-conditioned seminar room in old wing of department.

FRIDAY

Another personal guided tour to a batik (printed cotton) factory and to Malaysian Rubber Institute to see latex processing. We discuss the difficulty of teaching statistical thermodynamics in Malay; surely difficult enough in English. There is a problem when the final year students will be examined in Malay in two years' time, because traditionally external examiners come from UK or Australia. Should the examiners' scripts be translated? Final seminar at 15.00. No power failures this time to the relief of all. Last glimpse of KL, and its muddy estuary from which its name comes, as the A300 Airbus of Singapore Airlines rises into the fast falling dusk. And so to Perth, WA, but that is another Don's Diary.

Arthur K. Covington

The author is reader in physical chemistry in the University of Newcastle upon Tyne and recently visited Singapore, Malaysia, Taiwan and Robloxan, Mexico, and received a medal of the Royal Society of Chemistry.

Hamilton sale error admitted

by David Ross

Speculation is growing that former Scottish education minister, Mr Alex Fletcher, will not survive the next ministerial reshuffle because of mistakes made in the sale of Hamilton College of Education. Mr Fletcher is at present minister in charge of consumer affairs at the Department of Trade.

Although the Government has been at pains to defend Mr Fletcher against Labour charges of incompetence and calls for his resignation, it is seen as significant that official responses have also accepted that there were errors in procedure.

On Monday, before a three-hour House of Commons debate on the sale of Hamilton, the Government issued a Treasury minute in response to the recent Public Accounts Committee report which had been critical of the Scottish Education Department's handling of the sale.

In the minute the Government accepts one of the PAC's major criticisms - the failure to take advice from

the chief valuer (Sentland). "The department (SED) accepts that it should have attempted to reconcile the views of the governing body (Jordanhill College) charged with the sale of Hamilton and the advice of the chief valuer that estate agents should be appointed before finally approving the appointment of the selling agents."

Later in the minute the Government accepts that more could have been done when it became obvious that the level of offers was disappointingly low.

"The department remains of the view that the appraisal evidence indicated that a realisation would have involved a serious financial risk; it accepted, however, that before reaching the decision to approve the sale, it should have explored more thoroughly with the chief valuer the course of action then available in the light of his advice and the appraisal evidence; and it regrets that by inadvertence the advice received from the chief valuer was not made known to the Treasury."

In addition to the publication of the

Treasury minute the Secretary of State for Scotland, Mr George Younger, also issued a statement accepting the mistakes were made. Although he defended the decision to sell, he made no reference to Mr Fletcher.

It is understood that Mr Fletcher is advice in commenting publicly that criticisms of him over the sale of Hamilton were "ignorant and stupid". It is obvious that his former colleagues at the Scottish Office now accept that errors were made and that Mr Fletcher's response only made their attempts more difficult to extricate him from the controversy.

During the Commons debate the Labour MP for Hamilton, Mr George Robertson, called for Mr Fletcher's resignation and failing that, his sack. He cited the example of Lord Carrington and said that a Government minister should have enough dignity to accept responsibility for mistakes made by them or by their department. (TES)

ILEA election plan would aid opposition

by Karen Gold

Direct elections for the Inner London Education Authority based on parliamentary constituencies could bring opposition parties to within a hair's breadth of gaining power.

At present the ILEA comprises 35 directly elected Greater London Council members, and another 13 from inner London boroughs and the City of London. It has virtually a permanent Labour majority.

But the Cabinet is expected to consider soon arguments for a directly elected ILEA, possibly to be set up before the proposed abolition of the GLC in 1986. The scheme it will look at is for two authority members per inner London parliamentary constituency, making 38 members in all. On the voting pattern of the last general election this would cut the current Labour majority from 21 to two.

Currently on ILEA Labour has 35 members, the Conservatives 11, the Social Democrats two and there is one Independent. By doubling the number of MPs returned for each party in last year's general election in the inner London constituencies, the figures become Labour 30, Conservatives 24 and the Alliance four.

In the White Paper *Streamlining the Cities* published last October and recommending the abolition of the GLC and other metropolitan counties, the ILEA was to become a board of members elected to borough councils and seconded from them.

But members of all parties on the authority have lobbied vigorously against that and for direct elections. They are believed to have convinced the Secretary of State for Education Sir Keith Joseph, but not so far the Prime Minister.

Fitzwilliam also to abandon Cambridge entrance exam

by Ngao Crequer

Fitzwilliam has become the second Cambridge college to drop the special Cambridge entrance examination after September/October.

Like Emmanuel College, Fitzwilliam will admit students on A level grades, but great weight will be attached to interviews. The new, simplified procedure, which is aimed at being attractive to a wider range of schools, will operate for applications next year, for 1986 entry.

Dr Robert Lethbridge, the senior tutor said: "Our intention is to make Cambridge a possibility for every ambitious sixth-former in the country." Students of exceptional promise, based on interviews, school reports and O-levels, will be given unconditional offers.

Today a two-day conference begins at Oxford University to explain and clarify for schools the new admission procedures to be introduced in 1985.

New travel evidence in NUS survey

Ministers have received new evidence from the National Union of Students of the impact of plans to introduce the rate repayment of travel costs.

The NUS president Mr Neil Stewart, has called for a further meeting with Mr Peter Brooke, under-secretary for higher education, to discuss findings of an independently conducted survey of student income and expenditure. He claims this shows that the numbers who will be hit severely are higher than first thought.

Conservative MPs are said to be concerned that decisions seem to have been taken despite a lack of data on which to assess their implications.

The NUS figures show that London-based students will be hit harder than students in Scotland where ministers have decided against altering the present system. While the average cost of daily travel plus three return trips home was £135 for Scotland, it is £185 for London-based students compared with £78 for the rest of England and Wales.

The findings suggest that 47 per cent of home-based students spend more than £175 a year and will lose out even if the Government chooses the differential package offering £160 to them and £100 to others.

Of "away" students, 20 per cent of those in halls of residence, 41 per cent in rented accommodation and 38 per cent in lodgings spend more than £200 and will suffer hardship.

Mr Stewart told a rally of 10,000 in London at the weekend that NUS will not stand by while over 100,000 students face this loss of money. We will not stand by while 35,000 lose over £130 per year, and 14,000 of those lose over £250 a year. That's not rough justice, as Peter Brooke prefers to call it. That's injustice pure and simple."

Grant cut concern at Keele

Keele University's grant would be reduced by almost 45 per cent between 1981/9 if cuts of 2 per cent per annum were implemented.

The university says in its submission that its "research objectives would be largely unrealizable and the quality and range of the university's teaching would be radically altered and impoverished" if such cuts, posited in the UGC letter, were made.

Even a cut of 1 per cent per annum would jeopardize its programme of strengthening its dual honours in science, which the UGC had asked for.

Keele makes the point that it is already doing much that Government and UGC are now calling for. All Keele graduates must have studied and been examined in the humanities/social sciences and in the sciences. "This compulsory provision for a breadth of studies, unique in British universities, already conforms to the Leverhulme Report's recommendation of a broader university education."

Its foundation year also allowed for students from a non-scientific background to take science to degree level. Yet as a result of the 1981 cuts entry to the foundation year was reduced by about 25 per cent to 300 home students, and a further reduction is being considered.

The university supports selectivity for research funding based on criteria such as academic publications, ability to attract external funding or completion rate of studentships and research contracts.

"However, if selectivity were to consist of establishing long-term centres of excellence, or favouring large universities or departments, then we would argue that these are too inflexible for an adequate response to the changing demands of research and to the changing capacity of researchers."

"We would contend that small, flexible and efficient universities and university departments can also be effective in their use of UGC funding."

Keele also has doubts about continuing the "new blood" programme long-term. This was because resources for these posts were now in direct competition with the rest of the recurrent grant, and it could delay steps to remedy imbalances in staffing.

Student sums are wrong, says teacher training council

by Patricia Santinelli

Government strategy on student numbers is under attack from the University Council for the Education of Teachers. It says current thinking is opposite to that needed for meeting the likely demand for teacher training places.

In its response to the strategy letter UCET argues that whereas at present one in eight of all qualified school leavers enter the teaching profession, by the mid-1990s one in five will be required. As an example, for graduates in English the proportion needed will rise from 37 per cent in 1981 to more than 50 per cent by the mid-1990s.

This means that it is vital to sustain both the present degree provision for training secondary teachers and an adequate flow of new graduates in main curricula subjects such as maths and English.

"Any institutional 'equality of reduction' following the letter could impale the basic fabric and make it impossible for the projected staffing needs of the schools to be met in a few years' time," the council says.

The council opposes the continu-

ation of the new blood scheme if its cost continues to be deducted from the Government grant to the UGC. "But we believe that individual institutions are certainly more aware of where their greatest need for new blood lies than various central committees might be."

On tenure and premature retirement UCET admits that the age profile of education staff is higher than for other university departments. But it says this is because such staff must have had several years of successful teaching experience in schools.

UCET stresses that although the dual support system is important in encouraging research, in the field of education it is currently inadequate. Where educational research involves school observations, placements and so on, it is time-consuming and expensive, and very often some worthwhile projects cannot be set up because of lack of funds.

The students' union view however for research students in education is particularly serious. There are simply not going to be enough well qualified researchers to serve the needs of education," the council says.

"Inevitable deterioration" condemned

Sir Kenneth Alexander, principal of Stirling University, has condemned the UGC for helping form the opinion that "further serious deterioration is now inevitable" through its 28 questions.

Sir Kenneth, writing in Stirling's annual report, argues that the UGC should have asked for comment on a series of proposals, following its own debate and response to Sir Keith Joseph's letter. But unfortunately the UGC had "adopted the role of post



Responses query use of data

by Ngao Crequer

Many people have questioned the University Grants Committee's use of controversial Government figures on student demand, it emerged this week.

Sir Peter Swinnerton-Dyer, chairman of the UGC, told education journalists that a lot of the responses to the debate on higher education strategy had questioned the numerical forecasts.

But Sir Peter said the UGC had used the Department of Education and Science figures because they had been the only ones published at the time. Alternative projections did not come till much later.

He also said that two or three other respondents had said the UGC should have been talking about principles, not money. "Splendid, knowledge for its own sake, now go out and support yourselves, is liable to be Sir Keith Joseph's line," he said.

Sir Peter explained there had been

Clinical research 'needs probing'

by Jon Turney
Science Correspondent

The UGC should institute a special inquiry into the difficulties facing clinical research, the Medical Research Council urges in its reply to the strategy letter.

The council says the close relationship between teaching, patient care and research presents special problems in this area, which are being made worse by new reductions in UGC and National Health Service funding.

More generally, the MRC says it has evidence from its research group scheme, launched in 1982, that UGC cuts put a number of distinguished research teams at risk, although it cannot say whether the cuts have fallen more heavily on research than teaching.

The MRC says explicit earmarking is not the best way to keep tabs on UGC funds for research. Instead, the council suggests, Sir James Gowans, proposes regular submissions from

The UGC has received about 150 replies so far to its debate on higher education strategy. *The THES* reports.

Responses query use of data



Sir Peter: used available figures

about 150 replies so far, about three from universities (which have until the end of the month to respond) 100 from individuals - mainly academics, about

40 from university departments, and 10 from powerful outside bodies. The only substantial emerging view was opposition to two-year degrees.

He said the responses had to be confidential because it was obvious that a sufficient number was intended entirely for their own eyes, not even for the DES. "There are on occasion some very frank comments which could not be sanitized. Unsensitized they are the kind of thing that could break up friendships."

Of the Association of University Teachers' criticism of the way he was conducting the debate, he said: "The AUT's view is that we will always be wrong."

On future cuts, Sir Peter said: "It does appear that ministers have realized, and Keith Joseph has realized that the sort of sharp, sudden cut does not produce the savings arithmetic most expect, but does cause a great deal of damage."

and the research councils, a position shared by the Agricultural and Food Research Council in its response.

However, the AFRC secretary, Dr Ralph Riley, differs from Sir James Gowans in his judgment over earmarking. Dr Riley says this would be an effective way of maintaining research capabilities, especially in fields like agriculture and veterinary research.

The AFRC response also offers a strong endorsement of selectivity and concentration on the university side in the research areas covered by the council.

Dr Riley points out that many faculties and colleges of agricultural and veterinary science are some way away from their universities and suggest some have become weak through cash starvation and too little contact with basic research.

The AFRC believes research has suffered disproportionately from the cuts, but cannot prove it - a problem shared by all the research councils in their dealings with the UGC.

In spite of the current funding pressure, the MRC backs the dual support system by which university research funds come from the UGC

each university telling the UGC details of a proposed research portfolio and how it would be affected by rising or falling budgets. This is similar to the assessment the research councils make each year when the science budget is being negotiated.

Sir James writes: "Given such a mechanism, there would be established a broad commitment to research by each university which could be taken into account by the UGC in making allocations and which would gradually become susceptible to selectivity." He suggests this would also make it easier for the research councils to make best use of their research grants to universities.

In line with this, the MRC backs greater selectivity in research support in different universities, but says the initiative must come from the universities themselves.

The MRC says explicit earmarking is not the best way to keep tabs on UGC funds for research. Instead, the council suggests, Sir James Gowans, proposes regular submissions from

the University of Wales Institute of Science and Technology is another university to question the assumptions of the Swinnerton-Dyer letter, writes Ngao Crequer.

They say that the range of discussion is narrowed by the questions posed. Limits are set and philosophical stances are taken many of which they would oppose.

On resources they say that defence and health apart, education must be the highest priority of the state. Cutting education is not only defeatist but against the Government's stated aim to raise standards.

UWIST rejects the committee's assumptions on scholarship. "An institution is not a university unless those who teach there are also contributing by their research and writing to that body of knowledge that they and others teach. An institution in which the teachers can only expound what others have written has no place as a university."

The university says there is no evidence that recent cuts have fallen more heavily on research. But more time and effort has been put into attracting external funds and this may be sufficient to sustain.

The students' union view however for research students in education is particularly serious. There are simply not going to be enough well qualified researchers to serve the needs of education," the council says.

"Inevitable deterioration" condemned

Sir Kenneth Alexander, principal of Stirling University, has condemned the UGC for helping form the opinion that "further serious deterioration is now inevitable" through its 28 questions.

Sir Kenneth, writing in Stirling's annual report, argues that the UGC should have asked for comment on a series of proposals, following its own debate and response to Sir Keith Joseph's letter. But unfortunately the UGC had "adopted the role of post

40 from university departments, and 10 from powerful outside bodies. The only substantial emerging view was opposition to two-year degrees.

He said the responses had to be confidential because it was obvious that a sufficient number was intended entirely for their own eyes, not even for the DES. "There are on occasion some very frank comments which could not be sanitized. Unsensitized they are the kind of thing that could break up friendships."

Of the Association of University Teachers' criticism of the way he was conducting the debate, he said: "The AUT's view is that we will always be wrong."

On future cuts, Sir Peter said: "It does appear that ministers have realized, and Keith Joseph has realized that the sort of sharp, sudden cut does not produce the savings arithmetic most expect, but does cause a great deal of damage."

and the research councils, a position shared by the Agricultural and Food Research Council in its response.

However, the AFRC secretary, Dr Ralph Riley, differs from Sir James Gowans in his judgment over earmarking. Dr Riley says this would be an effective way of maintaining research capabilities, especially in fields like agriculture and veterinary research.

The AFRC response also offers a strong endorsement of selectivity and concentration on the university side in the research areas covered by the council.

Dr Riley points out that many faculties and colleges of agricultural and veterinary science are some way away from their universities and suggest some have become weak through cash starvation and too little contact with basic research.

The AFRC believes research has suffered disproportionately from the cuts, but cannot prove it - a problem shared by all the research councils in their dealings with the UGC.

In spite of the current funding pressure, the MRC backs the dual support system by which university research funds come from the UGC

each university telling the UGC details of a proposed research portfolio and how it would be affected by rising or falling budgets. This is similar to the assessment the research councils make each year when the science budget is being negotiated.

Sir James writes: "Given such a mechanism, there would be established a broad commitment to research by each university which could be taken into account by the UGC in making allocations and which would gradually become susceptible to selectivity." He suggests this would also make it easier for the research councils to make best use of their research grants to universities.

In line with this, the MRC backs greater selectivity in research support in different universities, but says the initiative must come from the universities themselves.

The MRC says explicit earmarking is not the best way to keep tabs on UGC funds for research. Instead, the council suggests, Sir James Gowans, proposes regular submissions from

the University of Wales Institute of Science and Technology is another university to question the assumptions of the Swinnerton-Dyer letter, writes Ngao Crequer.

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Sixth International Conference on Higher Education

28-31 August 1984

University of Lancaster

This major conference, the sixth in a triennial series, is open to all concerned with higher and tertiary education, whether in polytechnics, universities or colleges and institutes of higher education. It will re-examine fundamental aims and processes of higher education in the light of advances in information technology, social and demographic changes, and an uncertain future of adaptation without growth.

OPENING ADDRESS
David Pierpont Gardner
President, University of California

GUEST SPEAKER
Mr Peter Brooke, MP
Parliamentary Under-Secretary of State with responsibility for higher education

STUDY GROUPS AND KEYNOTE SPEAKERS

1. Aims and Content of Undergraduate Curricula
Prof. John Ashworth
Vice-Chancellor, University of Salford

2. Processes of Learning
Prof. Sören Haldén
Department of Philosophy, University of Lund

3. Post-Experience Education
Naomi Sargent McIntosh
Senior Commissioning Editor (Education Programming), Channel 4 Television

4. The Management of Change
Derek Brlay
Rector, Ulster Polytechnic and Vice-Chancellor Designate Proposed University in Ulster

5. The High Technology Academy
Prof. David Hawkrig
Director, Institute of Educational Technology The Open University

6. Research and Teaching: Are They Complementary?
Prof. Sir Brian Pippard, FRS
Department of Physics University of Cambridge

Proposals for papers (in the form of an abstract of no more than 1,000 words) on any of the six Study Group Themes are warmly invited, but should be submitted without delay to the address given below.

The full residential conference fee is £155 (re

Too many, too small courses worry Hull

by Ngauo Crequer

A working party at Hull University is very worried about the large number of degree courses which attract very few students.

The working party set up to look at the range of academic activity has reported that for the 1983/84 session no less than 60 courses each had a total of five students or fewer registered over the whole of the three years of the course.

It says: "To external eyes at least, it would seem logical that the number of degree courses offered by the university should reflect, at least in part, the loss of 20 per cent of the teaching staff since 1981."

The working party entirely accepts the argument that "one man's course proliferation is another man's course identification", and also accepts that the policy of expanding course provision in the 1970s to stimulate applications served the university well at the time.

"We also accept that the provision of a wide range of course combinations does not necessarily increase the range or the fragmentation of teaching." Nevertheless the working party recommends that departments - examine courses with few students, particularly joint degree courses.

The working party is reviewing university policy regarding subject viability and range of courses, and considering changes in academic organization, as a result of staff cuts and past and future financial cuts.

It has classified subjects according to whether they are at risk, but says this is illustrative only. Five departments are "already below the critical threshold" where the restructuring of courses, staffing and organization needs to be immediate, preferably in time to influence the 1982 entry. They are history of art, statistics, Russian studies, Scandinavian studies, and theology.

Ten departments need a new organizational and degree structure, 16 are not immediately at risk but may have medium-term problems, and 13 are large enough to withstand further staff losses yet sustain a viable degree programme into the 1990s "without difficulty".

The working party has taken it as read that the university does not wish to contract the number of subjects it teaches, and wants only voluntary staff reductions. It says it is clear that the UGC disavours a reduced departmental staff trying to carry on its previous full range of teaching.

It also says the time has come to cease to regard the subject/department model as the university goal. New groupings for subjects could be examined, and in some cases a school could subsume existing departments.

Tin council funds park

This week's science park inauguration was at Brunel University, where the International Tin Research Council has agreed to lease land for a new 80-strong headquarters laboratory.

The new laboratory will occupy two-and-a-half acres of a proposed six-acre science park site and will be ready in two years' time. Meanwhile Brunel will use the money raised from the lease, together with additional university funds, to construct the first of a series of planned incubator buildings.

The total sum to be spent remains undisclosed but the Tin Research Council will be spending several million pounds on the entire development.

Brunel believes its science park site is well placed to attract firms from the so-called "software valley" which stretches down the M4 to Bristol.

In a development with wider significance for university-industry relations, a consortium including the Department of Trade and Industry and Barclays Bank has agreed to back a study of the growth of high technology industry in Cambridge to be published later in the year.

Last year's report on academic-industrial collaboration from the Advisory Council of Applied Research and Development recommended a study of the "Cambridge phenomenon" - a particular study whether the rapid growth of such firms near Cambridge was largely due to proximity to the university. This is a different issue from the success of Cambridge University's own separate science park development, recently found to have a relatively poor record of fostering academic research links.

Professor Cairns Aitken, chairman of the college council, said: "Limbo is an unpleasant place. The insecurity for students, present and future, as well as for staff, and preoccupation with uncertainty, casts a brake on more constructive endeavour. The sooner the transfer is completed the better for all concerned."

The college is now overtly expressing dissatisfaction with the region. Napier's principal, Dr William Turmeau, recently claimed that Napier faced a cut of £345,000 and the loss of nearly 60 student places, barely three quarters of the cut Lothian is to make in further education. Napier was being victimized by the region, he said, because of the impending transfer.

But Mr David Semple, Lothian's director of education, said: "There is no foundation either for the suggestion regarding the budget or the allegation that the region is dragging its feet on the transfer issue."

Mr Semple confirmed that there is to be a £460,000 cut in further education, but said this was a relatively small reduction in the total further education budget of almost £26m. All the region's colleges would face a cut, but details of the amount were still being discussed with the principals, he said.

Mr Semple added that further education has been protected to a large degree in recent years, and it was only this year that the council had taken a specific decision to reduce the budget. But an official statement from Napier says it has suffered substantial reductions in resources over the past five years, despite an increased student intake, and condemns the cuts as "rough justice."

His latest figures for last year's graduates show 76 per cent finding jobs, a 5 per cent increase on the previous year, with only 13 per cent believed to be unemployed.

V-c to retire
Professor Philip Reynolds, vice-chancellor of Lancaster University is to retire in September 1985. Professor Reynolds, who is 63, became vice-chancellor in January 1980, after serving the university for 16 years. He was also one of its founding members.

Sheffield aids Oxford
Sheffield University is to teach Oxford University students Japanese before they start their own three-year course. About 10 Oxford students will attend Sheffield to take part in the preliminary intensive language year at its Centre for Japanese Studies.

The Oxford students are from the Oriental Institute. The university currently has a three year degree course but has been intending to extend it to four to include a preliminary language year. All the first-year Oxford students will take the course, and Sheffield will provide residential accommodation. Sheffield's own intake is 15-20 a year.

The University Grants Committee has agreed to the award of an additional £25,000 a year for two additional staff at Sheffield's Centre of Japanese Studies for three years, possibly renewable for a further two years.

A Sheffield official said: "Intensive teaching during the first year of Japanese from scratch is already a feature of Sheffield's four-year course."

The other main centres for the teaching of Japanese are Cambridge and the School of African and Oriental Studies in London.

Jack Straw

The author is Labour MP for Blackburn

Transfer college goes solo

by Olga Wojtas

Scottish Correspondent

Napier College has unilaterally established three working parties to consider the college's transfer from Lothian Region to central government control.

The college is clearly determined there should be no delay in its transfer, proposed for next April, and says it is frustrated by the slowness of the current negotiations between Lothian and the Scottish Education Department.

Napier has written to Mr Allan Stewart, Scottish Office minister for industry and education, as well as to the regional council's convenor and chairman of the education committee, telling them of the move and inviting them to be represented.

The working parties are to advise on the structure and composition of the college's new governing body, the changes in administration and financing, and conditions of service.

Professor Cairns Aitken, chairman of the college council, said: "Limbo is an unpleasant place. The insecurity for students, present and future, as well as for staff, and preoccupation with uncertainty, casts a brake on more constructive endeavour. The sooner the transfer is completed the better for all concerned."

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Earn-and-learn scheme urged

by Maggie Richards

Measures to make higher education more appealing to mature students by introducing tax concessions and a system of job-and-education sharing have been outlined by the Council for National Academic Awards.

The two suggestions are put forward by the CNA's academic policy committee in its submissions to the National Advisory Body's continuing education group.

And in an address to the Polytechnic Association for Continuing Education last week, Dr Alan Matterson, assistant chief officer of the CNA, called for the establishment of a high level "transitory" committee on continuing education.

The CNA's submissions on continuing education call for consideration of a system of job-and-education sharing, with students undertaking part-time study and part-time work; and tax concessions for companies and individuals participating in higher education.

The CNA document suggests institutions should be encouraged to be more entrepreneurial in their approach, and should be given greater freedom to provide educational services on a commercial basis, using the income earned to fund further activities.

It also urges an improved grant scheme for mature students, and a restructuring of procedures for assessing resources on part-time and short courses, including a review of the way their student numbers are converted into full-time equivalent figures.

The CNA agrees with the basic definition of continuing education put forward by the NAB continuing education group, as comprising any form of education undertaken following an interval at the end of initial education. But it declares that the main thrust of continuing education policy at present should be directed towards professional training and retraining.

There is also potential for the development of mixed mode study, with students alternating periods of full-time and part-time study according to their needs, or combining periods of full-time study with some distance learning.

In his address to the PACE conference Dr Matterson referred to the University Grants Committee's recent report on continuing education. Set alongside the NAB group's work and developments within the Manpower Services Commission, it appeared the "general atmospherics" were right for a rapid advance over the next few years.

It was therefore important to establish a transitory continuing education committee, involving not only the CNA, the NAB and the Business and Technician Education Council but also the UGC, the Department of Education and Science and Her Majesty's Inspectorate, he said.

But the polytechnic engineers believe this is an impossible target for departments with high student staff ratios. In a comment on the council proposals, the CEP says: "a department with a student staff ratio approaching 11, and having to provide the close tuition required by an engineering student, will have little time for attracting external funding. Such departments will thus be caught in a trap."

Otherwise, the CEP backs the Engineering Council's call for earmarking of funds for enhanced and extended engineering degree courses, for industrial exchanges for academic staff, and for an increase in departmental equipment grants. On equipment, the CEP says many polytechnics have not had enough cash recently to maintain quality and standards of equipment, let alone improve it. The committee suggests the council's target of £120,000 a year for a department with 200 students is enough to begin enhancing equipment.

Professor Gordon MacLennan of Leicester University, chairman of the Engineering Professors' Conference, also welcomed the council policy statement as a step in the right direction. But he was concerned that the council had not allowed enough for the cost of teaching engineering applications in their estimates of the money needed for advanced courses.

The meeting is intended to involve all 22 directors of education in the authorities, concerned as well as officials of the TVEI unit.

The chairman of the Manpower Services Commission has invited all 22 local authorities which were unsuccessful in bids for Technical Vocational Education Initiative projects to exploratory talks next month.

Mr David Young took the decision after receiving letters of complaint from many of the unsuccessful local

education authorities expressing their disappointment. They asked for detailed reasons for the rejection on the grounds that their projects were comparable to others which had been accepted.

In addition, MSC commissioners expressed some concern and said they wished to sustain the enthusiasm and

commitment of all those involved within such authorities. Mr Young himself indicated at the same time that there might be special help for smaller local authorities.

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Row erupts over YTS rate

Disagreement has erupted between the local authority association and the Confederation of Business and Industry because of a substantial gap in the new national rate for off-the-job training on the Youth Training Scheme each side wants to set.

At a meeting last week, it emerged that the CBI wanted to raise the minimum £14.70 rate by only 5 per cent of 73p while the local authority associations wanted to bring the rate up to between £23 and £26.

A further meeting of the elected officers of the associations and the CBI negotiating team is expected to take place next week, but privately the officers admit that prospects of an agreement look bleak because of the gap between each side's figures and their position.

The local authority associations have argued for some time that the low rate has resulted in them having to subsidise YTS, and has led to serious financial problems in many areas.

The CBI has argued that colleges were far too expensive, and that 5 per cent is sufficient on the grounds that the Manpower Services Commission has raised the block grant for managing agents by only the same amount from £1,950 to £2,050. Moreover some CBI members are believed to have argued for a reduction in the rate.

Hopes of a compromise are not totally ruled out, however, because each side is aware of the urgent need for a new national rate.

Meanwhile, the Youth Training Board was being asked yesterday to endorse a Manpower Services Commission proposal for a review of the size and shape of YTS in 1985/86, with the aim of producing a report by the summer.

Correction
Professor Jeffrey Jowell, of the faculty of laws at University College London, does not advocate or use multiple choice examinations, as wrongly implied in *The Times* of March 2.

Last Sunday, while on my way to fulfil a childhood ambition, I collided with a horse, ambulatory for their children. I was walking from the Metro station to take a nautical journey to the top of the Eiffel Tower. They were emerging, well dressed and scrubbed, from smart apartments in the Septieme to catch the train to Versailles. The bourgeoisie - and a good deal more haute and petite - were on the warpath. Altogether, a half a million of them made the pilgrimage to the Sun King's palace to protest at the Mitterrand government's proposals to reduce state aid to the private, and religious schools of France.

In terms of numbers alone, it was a demonstration of breathtaking size - twice as many at least as those who participated in the British CND's record demonstration last autumn. But even more striking was the demonstration's obvious power. These were not the ragged and dispossessed, fighting for things they had not got but the chic middle class defending what they already possessed, and ready to fight for it with a vengeance.

As the lift in Champs Elysees jolly

went higher, and Alice, my wife, swooned, and I felt as if my stomach had been left many floors below, I began to reflect on whether the Labour Party had anything to learn from Mitterrand's efforts to reduce the influence of non-state education. What would be the nature of the opposition that we would encounter if, during the next Labour government, we took serious steps towards our stated aim of phasing out fee-paying education? and integrating the private sector into the state. At what point in our journey towards equality would the middle classes of Surrey, Sussex, Kent and Chelsea, descend on Windsor Great Park, there to be addressed by the Leader of Her Majesty's Opposition (Margaret Thatcher) and the headmaster of Eton? (There would be no doubt be a ritual stop on the way at Runnymede, and many

references to the impending abolition of ancient liberties.)

Parallels with France should never be taken too far. Their traditions are different. In Britain it is unusual for right wing groups to see demonstrations as a vehicle for their political protest: the street (the National Front apart) is for the left, the unwashed. In France, the right has often used the street as much as the left - as the great demonstrations of professionals last year bear witness, and do the recent lorry drivers' protests, whose Pujadist instincts have much more in common with our Grantham grocer's daughter than with Moss Evans and the T & G. In France the divide between the religious and secular in politics, and between church and state is more marked, with the church now clearly associated with the right than in Britain,

and strong anti-clericalism never far below the surface. But the tension is here in Britain. Indeed, the religious tensions may be run so deep that, with Northern Ireland as a daily reminder of what can happen when they are unleashed, we keep them buried. It is not that the people do not have strong feelings on the subject. But afraid of them, the subject is simply off limits. Dismantling the 1944 settlement on religious schools is not on the agenda; and on the rare occasions the subject of the C of E and RC schools is mentioned, discussion is quashed with reminders of the importance, to Labour, of the Catholic vote (and now of the Muslim vote too).

Nonetheless, there is a warning to be had from Versailles. When people care more passionately about their children than anything; those



Prince Philip, chancellor of Edinburgh University, flanked by university principal Dr John Burnett, chats to craftsman Mr John Smith and his wife Margaret. Mr Smith carved the city and university crests on a lectern given to the university for its four hundredth anniversary last year by the city of Edinburgh. Prince Philip was the first speaker to use the lectern when he gave an address on "The Tribal Factor". The lectern was designed by Mr Christopher Holmes.

Cranfield move sparks union anger

by David Jobbins

Industrial relations at the prestigious Cranfield Institute of Technology have hit an all time low, according to union leaders angered by plans to end established procedures for consultations and negotiations with their employees.

They are challenging an announcement by Sir Henry Chilver, the vice-chancellor, that the bimonthly meetings between representatives of the five campus unions and the five faculty deans are to be dropped.

Instead, Sir Henry has told the unions pressing a resumption of joint meetings - the last was held in May last year - that policies adopted by the institute will be communicated to employees through their departmental heads.

One local union officer commented: "It is the beginning of the end as far as the union movement on the Cranfield campus is concerned. It is as bad as that."

And Mr Terry Carberry, chairman of the joint trade union council, said: "I have been involved here for the past

20 years and I do not understand it. All I can envisage is that it is a move towards the sort of things which are taking place in industry."

"While we have tried to work together in a common cause, both employers and employees, it now seems to be a case of dividing up. We have never had a dispute in all the years I have been here and this is the first time we have had to table a failure to comply with agreed procedures."

The unions say that since August 1983 formal requests for meetings had been effectively ignored to the extent that a formal letter of complaint was sent to Sir Henry in early December. It was this letter that prompted the announcement that the joint meetings should be discontinued.

The full time officials of the five unions, the Association of University Teachers, the Association of Scientific, Technical and Managerial Staffs, the Amalgamated Union of Engineering Workers, the National and Local Government Officers Association, and the Transport and General Workers Union, have now requested for-

mally a joint meeting with Sir Henry in the chair on March 27.

Among issues the unions are anxious to discuss at institute level are procedures for notification of sickness, implementation of an agreed review of grading for clerical staff who change jobs, the increasing use of limited term contracts for academic staff, and the delays in getting local salary negotiations for ancillary staff under way.

They have now agreed a 2.5 per cent rise from November 1983 and a reduction in the working week to 37½ hours from April.

One key area is the implications of the take over of civilian teaching responsibilities at the Royal Military College of Science at Shrivenham. The unions say that since August last year they have unsuccessfully sought discussions with the employers, and were not invited to meet RMCS staff when they visited the institute.

The institute was approached for its response to a request for a meeting with the unions and for a general comment but had not responded before *The Times* went to press.

PARTY LINE

The discreet power of the bourgeoisie

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with the most privilege to defend are likely to be willing to fight all the harder. On the 1980 working party on private education, we followed through to their logical conclusion some of the "simpler", more "straightforward" methods of implementing a policy of no private sector at all. They ended in jail for parents who withheld their children not from education but from a state school; a prospect that no democratic socialist party could contemplate, either on moral

Genetic institute splits in two

by Thomas Land

A controversial genetic engineering research institute intended specifically to serve the needs of the hungry belt of the globe may well be established in two principal components based in Italy and India.

In addition, several countries including Egypt, Tunisia, Pakistan, Thailand and Spain are expected to set up major scientific centres to affiliate with the international institute and participate in its programme of work.

The projected International Centre for Genetic Engineering and Biotechnology is the brainchild of Dr Susan Narang, a molecular biologist with the National Research Council of Canada. He is a consultant of the Vienna-based United Nations Industrial Development Organization (UNIDO) which is backing its establishment.

Its other global sponsors include the International Federation of Institutes for Advanced Study and the Club de Genève. About 30 governments and many universities and leading scientists are also supporting its establishment.

The compromise over the siting of the institute has been worked out by an influential international committee of UNIDO in Vienna. But it is still subject to formal approval later this year. It is likely to end fierce competition by many countries for hosting the institute in the hope that its presence would encourage local research.

For biotechnological innovations are expected to make an enormous impact on agriculture, medicine and energy related industries within the foreseeable future. Such breakthroughs could bring benefits to billions of people in the hungry world — but at present, biotechnology is the virtually exclusive domain of the rich countries.

Dr Narang, an Indian, explains: "If developing countries do not start to bridge the gap today, in 10 years' time it will be impossible. They have two alternatives. They will either get in now and start to understand how to use this knowledge for their benefit, or they can just wait for the industrialized

countries to develop this technology and will then have to buy it — which is the most expensive way to go about it."

His point is borne out by his employers' response to the controversy over the siting of the institute. Originally, Canada was widely expected to be chosen as its host — but its government politely declined at the first sign of friction and decided instead to invest over \$60m in a national biotechnology research institute.

Global escalation of investment in biotechnology began over a decade ago. The United States, Japan and West Germany have been the leaders in spending, but the impetus has been evident also in Britain, Canada, Scandinavia, France, Switzerland and New Zealand.

The price of the projected international research institute is also escalating fast. The UNIDO's original estimates called for a global investment of \$44m to cover its capital and operational costs for an initial five-year period.

But Italy alone has now pledged \$37m for siting half the institute in Trieste, and India another \$19m for placing the other half in New Delhi. In addition, the countries planning to establish major affiliated research centres have also made "generous" financial offers for the privilege of association, says the UNIDO.

The idea of establishing the centre goes back to 1981 when, at Dr Narang's initiative, the UNIDO brought together a very private meeting in Vienna of a dozen leading scientists concerned with genetic engineering. They agreed that among the initial tasks of the centre should be studies to further the development of cheap energy derived from waste materials.

One important task of the centre will be the training of specialists from the poor countries. The UNIDO's original plans envisaged the employment of 50 research scientists and 40 technicians with provision for 26 post-doctoral fellowships as well as 100 trainees to study at the institute for two years each. However, these plans may now appear excessively modest.

Bonn strengthens cooperation

The Bonn government plans to set up two research institutes in the United States and Japan as part of its efforts to strengthen international cooperation in the field of the arts and sciences.

Announcing details of the projects earlier this month, federal research minister Heinz Riesenhuber said the arts played an increasingly important role in solving the problems generated by the new technologies and modern social developments.

He said a historical institute would be set up near Washington to analyse US/German relations and conflicts of

the past, while an institute for east Asian studies would be set up in Japan with the aim of conveying an authentic picture of Japan to the Germans. While some 20,000 Japanese were currently studying German only 200 Germans were learning Japanese, Riesenhuber noted.

The research ministry already finances historical research institutes in London, Paris, Rome and Florence, as well as an oriental institute in Beirut which employ a total of more than 100 people. Last year the ministry spent some 35 million marks in arts and sciences.

Danish blues Denmark's higher education is on the brink of change. Donald Fields reports

Even if Danish higher education is faltering as the Conservative-led coalition government re-elected in January attempts to break the mould of a huge external deficit and spiralling budget deficits, the society around remains refreshingly tolerant and civilized.

Uniquely, Denmark belongs to both the EEC and the quietest of Nordic countries that cooperate in the social, cultural and economic fields. Though remaining a bridgehead, Denmark has become perceptibly more continental during its 11 years inside the community and experts compare its higher education structure with West Germany.

From 5 per cent in 1960, the share of the cohort passing the matriculation examination swelled to 25 per cent in 1977. During this period further and higher education was open — with exceptions such as dentistry and midwifery — to all those matriculating.

But with economic exigencies, expansion was gradually replaced by stringency. Since 1977 a *numerus clausus* has operated in numerous disciplines where studies are of long duration, with ceilings on the number of entrants and strict qualifying criteria applied when applicants outnumber available places. When quotas are fixed, the choice of students is dictated by three considerations: the future requirement for gradu-

ates in each sphere, the capacity of the various institutions, and the geographical distribution of applicants.

The present total number of students is around 33,000. With an annual intake of about 19,000 the number of applications exceeds places available by about 6,000.

As the second government of Mr Poul Schlüter, able to muster a wafer-thin parliamentary majority for its tough budget, swings into action no major changes are foreseen in the pattern of higher education or the resources it commands.

But the ministry of education is hoping to create some new places by deploying appropriate funds more judiciously and re-allocating between disciplines.

Mr Jakob Klitgaard, a senior aide to Mrs Birgit Hansen, head of university planning and budgeting in the ministry of education said: "The trouble is that the pattern of applications is lopsided. An excessive number of Danes want to enter the medical courses; extending to nursing and midwifery. The system is out of phase with existing job opportunities."

The problem seems exacerbated by the Danish student's slowness in completing degree courses — six or seven years is quite normal. Students have three chances to pass each examination they sit. At any one time more than half of them are



Previous speakers include Schmidt, Solzhenitzin, Roosevelt, Juan Carlos is eagerly awaited.

Harvard University is claiming a major diplomatic coup after four unsuccessful and embarrassing attempts to secure prominent international speakers for its annual founder's day ceremonies. Worried that they couldn't keep the news under wraps until last week, officials announced last week that the King of Spain, Juan Carlos I, has agreed to deliver the principal address at the university's 333rd ceremony on June 7.

Last year Harvard boasted of inviting Mr Lech Walesa, only to learn at the last minute that the Polish dissident feared that Warsaw would not permit him to return, or delay his homecoming while the Pope toured Poland. The Mexican author Carlos Fuentes bailed them out just three weeks before the event, which was made even more intriguing when a speech from Mr Walesa was smuggled out and read in *absentia* by Mr Derek Bok, Harvard's president.

Three years ago President Ronald Reagan turned down an offer to speak. The gesture reportedly came too late as Mr Reagan had committed

Juan Carlos makes it fourth time lucky

himself to address students at another college. Mr Thomas Watson, who chairs IBM and is a former ambassador to the Soviet Union delivered the talk instead.

When Mrs Jihan Sadat, widow of the slain Egyptian president, declined the engagement two years ago, Harvard tapped a distinguished member of its own teaching staff, Emeritus Professor John Finley, to do the honours.

Who will speak and who will receive honorary degrees at Harvard's founder's day celebrations is a matter of intense secrecy and a great guessing game.

The attention, though, is not with-

out merit. Harvard speeches have a tradition of controversy. Speakers have included former President Theodore Roosevelt, an 1880 graduate; former West German Chancellor Helmut Schmidt; and Mr Cyrus Vance, first Secretary of State to the Carter government.

In 1978 Mr Alexander Solzhenitzin, now a Vermont resident, delivered a stinging dissertation on Western values. In 1947 General George Marshall outlined a proposal for the reconstruction of war-torn Europe, which was adopted and called the Marshall Plan.

The 1968 talk by Shah Mohammed Reza Pahlavi was interrupted several times and a year later an estimated 60 per cent of the graduating class wore black armbands to demonstrate for equal admissions at Harvard for both men and women. The 1979 speeches were made memorable when a group of Cambridge residents, led by the city's official representative to Massachusetts state, temporarily seized the platform and microphones to protest against the university's housing policies.

Study rules out melting pot theory

from E. Patrick McQuaid
CAMBRIDGE, Mass

● Serious erosion continues in the rate of black and Hispanic secondary school graduates who pursue a college education.

● Among American blacks, 80 per cent of all PhD holders earned them in education and social science fields. For Hispanics the figure is 76 per cent.

The implications are that with a new emphasis from the government and in the secondary schools on science and technology, the historic under-representation of minorities in "high-income, high-prestige" employment is likely to worsen. High-technology and other economic trends will not only threaten minorities, but spill over into the white and blue-collar middle class "with loss of jobs and economic status."

On an especially bad note, the report suggests that these effects may begin making "a noted impact as early as the end of this decade." A marginal disclaimer states that data "is not comprehensive" but does provide "an overview of the demography and its attendant implications for education specifically and society at large."

The writing on the wall shows that the average age of the American white

population is "growing older" while that of the minority population "is much younger". Thus the retirement income of people at work today will depend largely on the income of minorities now enrolled in school.

The 1960s American melting pot theory is out: America is becoming more diverse, not more homogenous, says the study.

Blacks and Hispanics constitute the "majority of the minority" in the states with Hispanic growth continuing to be the highest among all ethnic groups. According to 1980 statistics blacks account for 11.7 per cent of the US population, Hispanics 6.4, and Asian-Americans 1.5 per cent of the whole.

Among Hispanics, 85 per cent reside in nine states, with 60 per cent bordering Mexico, a conduit for the bulk of Latin immigration legal and otherwise. Hispanics are also the most urbanized of American minorities, with 88 per cent found in the cities. More American blacks, however, reside in "inner cities", predominantly poor neighbourhoods, that in the past have been called ghettos. Inner city blacks total 71 per cent among their own, the highest figure among all groups.

The present minister of education, Mr Bertel Haarder (Liberal) is opposed to the *numerus clausus*, but the clash between those who view free entry as a top priority in a democracy and those who fear it will only lead to more structural unemployment could well sharpen.

Other obstacles to adjustment arise. There is a widespread consensus that more computer technologists are urgently required, but the salaries paid for all-important lecturers in the subject fall decisively short of those offered by private companies.

This also touches on the question of research, which is largely generated by a central organization consisting of the Danish Council for Scientific Policy and Planning, six national research councils, and the research council secretariat.

The common yardstick of percentage of annual gross domestic product devoted to research and development — 0.97, against 1.88 for Sweden, 1.38 for Norway and 1.08 for Finland — is not flattering to Denmark. But a recent study by the American Institute of Scientific Information, comparing nine Western industrialized countries and the USSR, cast things in a much more glowing light. Hence the Danes are the most productive in completing their research projects, requiring just over two years for each publication, and most cost-effective.

Until 1986, however, the upward trend in competition for university places will continue.

by a Special Correspondent

A mounting crisis within the beleaguered engineering departments of American universities is causing new strains in the delicate relationship between universities and the National Science Foundation, the United States' multidisciplinary equivalent of Britain's research councils.

Short of money for research and new equipment, overwhelmed by swollen undergraduate enrolments and unable to recruit enough staff, engineering deans claim the NSF has failed to pay enough attention to their desperate problems.

The NSF has vigorously denied the allegations and taken several new steps to reaffirm its support of engineering. But relations are likely to get worse, not better, following the introduction last month of a controversial Bill designed to change the foundation's name and charter to force it to devote more of its resources to engineering.

Many engineering deans support the Bill on the grounds that legislation is the only realistic way to increase engineering's share of NSF funds. Dr Robert Kersten, dean of engineering at the University of Florida, told a congressional sub-committee in

Engineering crisis mounts

February that NSF support through the years had been sporadic and sometimes questionable.

"This stems largely from the fact that NSF has no clearly stated engineering role in its mission statement. We need to institutionalize engineering within the foundation, and make it clear that we are committed to producing a strong science and engineering base in order to compete more effectively in world markets," he said.

The prospect of a normal change in its charter has caused little delight at the NSF. The foundation is practised at juggling the needs of the many disciplines it supports.

Congressional meddling is not expected to help. At the National Institutes of Health, where Congress already takes a strong interest in the appointment of research funds, officials say politics has distorted scientific priorities.

To prevent a similar problem at the NSF, the foundation's leadership has been emphasizing its commitment to the health of both research and training in engineering. The foundation's directorate for science and engineering

overseas news

education was recently taken out of mothballs, and the budget of the engineering research directorate is to increase by nearly 22 per cent to \$147m in 1985.

Dr Edward Knapp, the NSF's director, has promised that half of the "young investigator" awards introduced to lure new blood into university departments will be reserved for engineers. The foundation has also allocated \$10m in 1985 for the creation of a network of experimental university research centres to increase fusion with engineers in industry.

University engineers regard most of these steps as too little, too late. Dr Kersten, speaking for engineering departments in the 400 colleges and universities affiliated to the Engineering Education Task Force, said reactivation of the science and engineering education directorate was a "positive step", but pointed out that two thirds of its budget was for pre-college institutions.

He conceded that the increase in the engineering research directorate budget was a step in the right direction but one that started from too low a

financial base.

Why are the needs of engineering departments so great? Their problems have been caused by the meshing of several disruptive trends. Over the past decade, student numbers have risen more than 115 per cent, while staff numbers have grown only 12 per cent.

High salaries in industry have prevented universities from recruiting the new staff they need, and many departments are now heavily dependent on foreign postgraduates. Meanwhile, universities have been unable to replace out-of-date equipment. Surveys indicate the cost of modernizing research equipment could be as high as \$2,000m.

One consequence of engineering's woes is that the United States has fallen behind its international competitors in the production of trained engineers.

Even engineers admit that only a small fraction of these daunting problems can be blamed directly on neglect by the NSF. But they argue that although it provides only 1.3 per cent of research and development funds at

doctorate-granting institutions, the foundation's attitude is vitally important.

Paradoxically, the pressure for reform from university engineering departments has reached a peak just when academic engineers and the Reagan administration are beginning to agree on the kinds of steps needed to revitalize the discipline.

The National Academy of Engineering, for example, has responded enthusiastically to set up special university staff and students access to real-life engineering problems in industry. But while the NSF is to earmark \$10m in 1985 to designate a handful of centres, the academy is thinking in terms of a \$100m programme with more than a score of well-funded centres.

It is hardly surprising, therefore, that the academy — like the university deans and some Congressmen — has called on the NSF to become less preoccupied with basic science and pay more attention to the needs of engineering.

If it were passed, the Bill would compel the foundation to take engineering more seriously. But it might also sour relationships between engineers and scientists just when they were beginning to see eye-to-eye.

Authorities flush out the quacks

from E. Patrick McQuaid
CAMBRIDGE

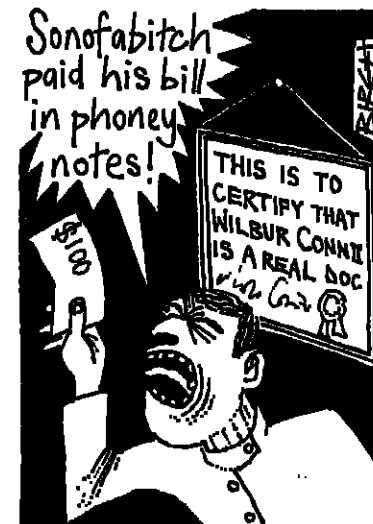
United States postal authorities investigating the booming mail-order degree industry have estimated that well over 3,000 people licensed to practise medicine may be frauds.

In California alone, the state board of medical quality assurance has identified 2,500 candidates for possible prosecution.

The proliferation of spurious medical credentials, first reported in January, is being investigated by federal and local authorities in at least 15 states, according to the *New York Times*. The page one account noted that the scope of the nationwide investigations was believed to go beyond anything undertaken in the United States regarding the proper certification of doctors since the early 1930s.

The inquiries, however, are not a coordinated effort and at least three federal agencies pursuing the matter are largely unaware of each other's activities.

Investigators with the Inspector general's office of the Department of Health and Human Services first learned of the enormity of the problem from the *New York Times* article. A source requesting a low profile called the figure "a bit steep and worrisome." But a ministry official commented: "It makes sense if you match the number of Caribbean diploma mills with graduates over the last 15 years."



The Health Ministry has formed a special task force to investigate not just phoney doctors but phoney doctors' bills. Last year the government reimbursed physicians and hospitals about \$80 billion through the Medicare and Medicaid programmes.

One programme pays the salaries of residents at American teaching hospitals. If a number of these residents are graduates of fictitious medical colleges or have purchased their credentials through a variety of mail-order schemes, the government is not only wasting millions of dollars but promoting fraud as well.

In addition to the Health Ministry, the postal authorities and the Federal Bureau of Investigation are conducting separate inquiries, as are individual state education and police departments and private agencies concerned with accreditation.

An American Medical Association official called the situation "a horrendous mess" and confessed the professional association did not know how to put a stop to the trafficking.

Arts graduates get help

from Barbara von Ow
MUNICH

Munich University has joined forces with the Employment Office in an unprecedented attempt to improve the job prospects of arts students.

Prompted by the extraordinary success of a series of job-orientated lectures last term, two institutions have decided to set up a joint body to organize courses for additional qualifications which should give arts students better chances of finding a job after university.

Experts from trade and industry will volunteer to give some of the lectures in economics, office management and employment law, which are to start by the summer term of 1985.

Until the 1980s, the majority of art students would be unable to find the job they wanted, even if they had good degrees. Otto Speck, vice president of Munich University, noted: "We want to show these students that there is an

alternative between becoming a teacher or a taxi driver," he stressed.

Last term Munich arts students thronged into a series of lectures given under titles like "Job chances in banking" or "The right job candidate for industry". According to the organizers the seminars had shown that arts graduates like teachers, political and social scientists and linguists, on principle had a chance of finding a job in industry.

However, most had to have additional qualifications and be prepared to work in new fields like computing, public relations or in staff departments. Art graduates in industrial jobs could only rise if they acquired a knowledge of office management, data processing, law and economics, they noted.

The Munich project could not change the fate of the mass of students, Mr Speck said. "This will not be a motorway to employment but a small jungle pass."

Controversy continues over reforms

from David Dickson

PARIS

Heated controversy continues to surround the French government's decision to widen access to the Ecole Nationale d'Administration (ENA), the elite training college for senior civil servants.

Previously, entry to the college was restricted either to recent university graduates, or to those already working for the government, both categories having to sit separate, highly competitive examinations. The government recently introduced a third category of candidates, those who have worked for a certain period of time either for a trade union or as elected local officials.

Last year, the executive committee and the administrative council of the association of former ENA students were forced to resign amid protests that they had not opposed the reforms sufficiently strongly when they were debated and subsequently passed by the National Assembly.

And in elections held for the new council last month most of the successful candidates were those who had openly expressed their concerns about a move which threatened what they claimed was the previous political neutrality of the selection process.

Opening up access to ENA was one of the more personal pre-election promises by François Mitterrand. The reform was pushed through the National Assembly by the minister of public service, Añel le Pors, one of the four communist members of Mitterrand's cabinet.

Defending these moves recently he claimed that their goal was "to improve the quality of the public officials trained at the ENA."

Forty-seven candidates were considered for the 10 places being initially offered to individuals from such backgrounds for entry to ENA next autumn. Two-thirds of the candidates were from trade unions, and the selection committee claimed that 25 were of sufficient standard.

In November the reforms were sharply criticized at the annual meeting of former ENA pupils.

Following the meeting a questionnaire was circulated to its 3,500 members asking for their general opinion on the government's reforms. The results showed that almost two thirds of those who replied accepted the principle that there should be an enlargement of recruitment to the ENA. However, over 90 per cent said they were firmly opposed to the government's decision to restrict this enlargement to the social categories defined in its reforms.

The association has made it clear that it intends to keep up the pressure for further changes, at least up to the next general election in 1986.

Grands Ecoles, page 14

Budapest goes commercial

Budapest Technical University plans to go commercial, with courses for fee-paying students from outside the socialist bloc. Fees will be paid in hard currency, and, according to the university's vice-rector Dr Miklos Ivanyi, a substantial proportion of the money thus earned will be retained by the university.

Although Hungary's foreign debt, in absolute terms, is less than that of, say, Poland, worked out on a *per capita* basis, it is the highest in the socialist bloc. During the last two years it has become increasingly difficult for academic institutions to keep up their subscriptions to foreign journals, or to

purchase scientific equipment from abroad. Academics, unless invited to an international conference (at the expense of the organizers) or taking part in an exchange scheme meet considerable difficulty in obtaining funds for travel to the hard currency areas.

Courses for foreigners will be given in various languages, including English. When interviewed on Budapest radio, Dr Ivanyi said that although the tuition rates have not yet been worked out, they will almost certainly prove cheaper than those of similar courses in other countries. Most students will probably come from the third world.

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When academics meet the defence establishment: Selina Hunt and Geoff Maslen (below) report

Skirmishing in secret

WORLDWIDE

The American Government appears to be heading for another confrontation with academic scientists over the tangled question of who controls the fruits of government-sponsored research. The Reagan administration has told the National Academy of Sciences it wants more control over the dissemination of "sensitive" scientific findings than the academy recommended in a major report in 1982. And in a spate of recent actions the administration has shown its readiness to make unparaphrasing use of its existing powers in order to keep American technological secrets out of the hands of the Soviet Union.

American researchers have already accepted the right of the government to insist, in special circumstances, that scientists show restraint in the publication of research with director military significance. Since 1977, for example, the National Science Foundation has sent all proposals for research on cryptography to the National Security Council to ensure that the nation's ability to make and break codes is not impaired. What is at issue now is whether the Reagan administration's preoccupation with national security is leading to unjustified interference with scientific freedom.

These are the kinds of incident that have caused concern. In September 1982, more than 100 technical papers due to be presented at a symposium of the Society of Photo-optical Instrument Engineers were withdrawn at the request of the Pentagon because they were said to contain "technical information that could not, by law, be exported to American's adversaries".

A fortnight later, at a meeting sponsored by the Institute of Electrical and Electronic Engineers, the US Air Force asked the conference chairman to destroy all records and abstracts and to cancel talks on several papers the air force claimed would compromise national security. When the chairman asked the air force to pay for the cost of cancellation, the demand was withdrawn.

In July 1983, the National Academy's organizing committee for an international conference on disarmament received 24 papers for publication from the US Army cold regions research laboratory. Just before the conference, six of those papers were withdrawn without explanation. Conference organizers said most of the withdrawn papers covered topics on which the Soviet Union was at least as

knowledgeable as the United States. Last November, an East German physicist, Alfred Zehe, was arrested during a meeting of the American Vacuum Society and charged with espionage. A week before the conference, the Federal Bureau of Investigation had asked for six FBI agents to be given credentials to attend the conference under false names.

In January, a meeting of the American Ceramic Society was split into two portions. One, officially a separate meeting but held in the same hotel rooms, was sponsored by the Department of Defence and the National Aeronautics and Space Administration. Only American citizens were allowed to attend. Foreign scientists have also been excluded from materials science conferences held at the University of California, Los Angeles and the University of Dayton, Ohio.

In many cases, such incidents have come to light only several months after they occurred, and appear to have been the products of decisions taken at a relatively junior level within the armed services or the Department of Defence. That has prompted fears that the secrecy regulations are becoming too complicated and extensive for either scientists or government officials to understand.

Confusion is hardly surprising

Dr Frank Press, president of the National Academy, told Congress last November that individual scientists no longer knew what sanctions, if any, could be attached to particular kinds of research conducted on government contracts. What was most disquieting, he said, was that government actions had been "disjointed, unpredictable, and vague in specifying the scientific fields they are intended to cover."

The confusion is hardly surprising. Current controls are influenced by 44 government agencies in 10 different departments through a smattering of different laws and regulations. For example, regulations specifying rights to

publish or patent new discoveries, or talk about them at international meetings, are promulgated by the state department, the Department of Defence, the office of export administration, the patent office and the energy department - to name but a few.

Concern about the extent of controls reached a high point in 1982, when senior officials of the Central Intelligence Agency began to address scientific meetings to warn that Soviet agents saw academic science as the "soft underbelly" of American national security. Admiral Robert Inman, then deputy director of the CIA, told university scientists that unless they took steps to protect their own research from enemy poaching, the government would have to impose new controls from above.

Alarmed by such statements, the National Academy of Sciences persuaded the Department of Defence to sponsor a joint study of scientific communication and national security, under the chairmanship of Dale Corson report, published in September 1982, would set the scene for a ceasefire, if not a fully-fledged peace, between government and the scientists.

It was not to be. The report was given a polite reception, but it was clear from the outset that its conclusions were too liberal for the administration's taste. While Corson agreed that Soviet espionage may have taken an interest in universities and research institutions, he doubted whether much useful information had been lost. Excessive secrecy posed a greater threat to American science because it chilled creative research. The sensible approach was to confine strict controls to a small number of genuinely sensitive disciplines, leaving the bulk free from controls.

Instead of acting on the report, the administration buried it in bureaucracy. It was given first to the White House science office for a detailed response, but that never emerged. Later, it was subsumed by a larger government-wide National Security Council study of technology transfer.

That study has been finished but its findings are still secret. By taking nearly two years to study the Corson report, the administration has managed to cool public debate about scientific freedom. Meanwhile,



individual departments have been moving to strengthen their controls of scientific publications. The department of defence, for example, recently completed an extensive review of technology transfer. Its main outcome has been a much tighter grip on the research it sponsors in universities.

The new system classifies all research sponsored by the department as either sensitive or non-sensitive, basic or applied. In the case of research deemed not to be sensitive, scientists are free to submit findings to publishers at the same time as to the department. All sensitive research, however, must be submitted first to the department, and in the case of applied research, the department retains the right to block publication.

Worse is to come

In a recent internal memorandum, the national academy said the new policy was far more conservative than the Corson committee had recommended and it warned that worse was to come. Academy members briefed privately on the results of the larger National Security Council study had come away with the impression that the administration intended to increase, not reduce, its powers to control the dissemination of research findings.

The administration's desire to clamp down on what researchers believe to be an illusory problem has put America's scientific leadership in a quandary. Against all the odds, science has fared very well under the Reagan administration. Federal spending on research and development will have grown by more than 50 per cent over four years. That does not take inflation into account, but it is generous enough to make the National Academy of Sciences wary of striking poses that might be considered ungrateful.

Yet the academy can ill afford to ignore government policies that appear to strike at the heart of academic freedom, particularly in light of the administration's failure to come up with convincing evidence that the Soviet Union really is stealing militarily useful secrets from American campuses.

Just how the academy responds may set the tone for government/science relations in areas well beyond national security. In a book just published by the American Association for the Advancement of Science, Cornell sociologist Dorothy Nelkin warns that traditional "marriage" between science and society has ended. The best that can be hoped for now is a "negotiated truce" in which scientists strike a balance between intellectual autonomy and the competing claims of other players as diverse as governments and environmentalists. It remains to be seen how tough a negotiator the academy will be.

provide a full range of courses and equipment.

When the college officially opens in 1986 (Dunroon cadets are at present using some of the buildings and occupying the living quarters) it will take on many of the academics who are employed at Jervis Bay and at Point Cook. According to Professor Wilson, the dons at Dunroon and Point Cook have been among the most successful academics in the country in attracting research funding. He expects that to continue to be the case in the new academy.

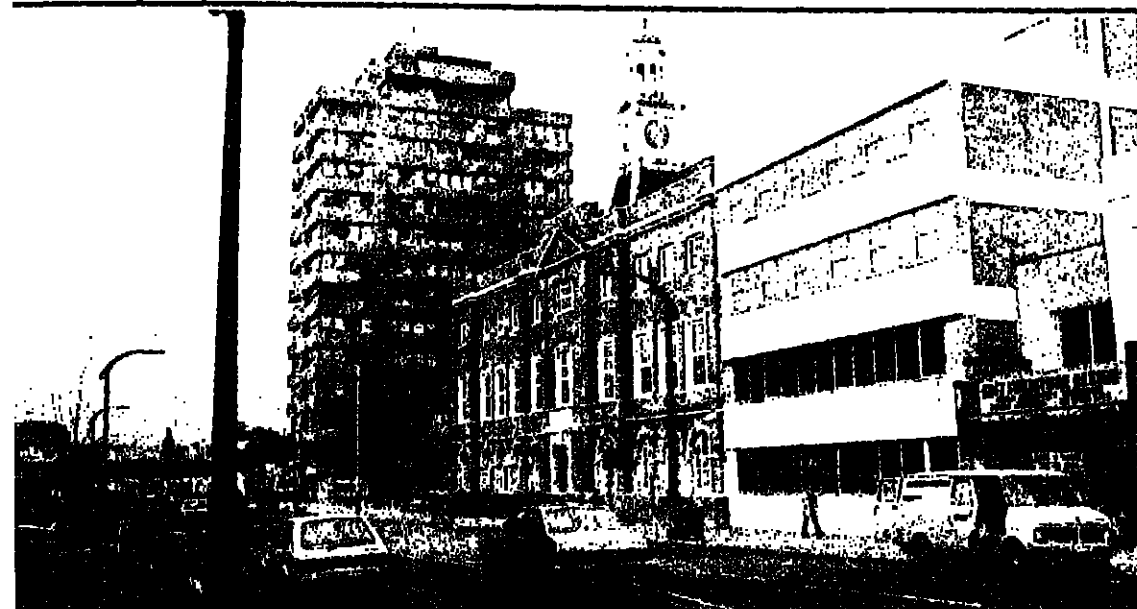
"We want the academy to be a prestigious national institution. The quality that's already evident in the buildings here reflects the importance of the defence forces and the government put on it. So we want our standards and the quality of the officers we turn out to match that." A Professor Wilson emphasizes that academic staff and the members of the defence forces will work along side each other as colleagues. Both groups will be represented on college committees - as will elected students on occasions and the officers' mess will also be the academic staff club. A building called the "academic house" will be a meeting place for everybody on campus: academics, cadets, officers and support staff.

There will be substantial common military curriculum for the three services - current affairs, defence studies, field craft and use of personal weapons among them. During vacations, single service training will be the norm. At the same time, there will be liberal leave opportunities for the cadets.

Graduates of the new academy will no doubt become the cream of the armed forces. Their training alone, with their salaries, will have cost the government in excess of A\$100,000 for each cadet over three or four years. On average, those who complete the course might be expected to remain in the armed services for 12 to 15 years.

Professor Wilson says that of the students who don't succeed in their academic studies, about 5 per cent will probably continue in the armed services. Altogether, about one in four entrants will drop out entirely although perhaps a tenth of this group will make that decision in the first few months at the academy.

The financial loss through dropouts has been shown at Dunroon to be very low. Professor Wilson says, "If you spread the numbers over three or four years it's a small number each year."



The Polytechnic of North London: target of criticism

A year of attrition . . .

Whatever happened to Marxist bias? Last March the CNAA around the Polytechnic of North London was thick with allegations of left-wing indoctrination. A year and four investigations later, almost the only thing not causing disagreement about PNL, its paymasters and validators, is the objectivity or otherwise of its teaching.

What has gone to the top of the agenda since last March, when a former member of the polytechnic's sociology department presented the government and the Council for National Academic Awards with a dossier of "bias" and "academic irregularities" in sociology there?

There are five main items. One, examination practices, was specifically mentioned in the dossier, which was repudiated by the CNAA last July. Two others, the abilities of the CNAA and the polytechnic to keep their academic houses in order, were implicit in the criticisms of the department.

The fourth, the problems raised by the Inner London Education Authority's inspectorate of transfer, as one degree replaces another, has only arisen in the last few weeks. The fifth came out of the blue in October, when Her Majesty's Inspectorate published its report on a spring bank holiday visit to the polytechnic's department of sociology and applied social studies.

The departments combined a "long tail of poor achievers," the report said, studying in an "air of casualness". Both points were picked up by Sir Keith Joseph, secretary of state for education and science, in a letter to the ILEA asking what they were going to do about it.

Sir Keith's letter did not refer to the practice of the two departments' main degrees - BSc sociology and BSc applied social studies - of circulating exam "themes" to students several weeks before their exams.

The CNAA summer investigation of the dossier found the practice was "technically proper, is being implemented appropriately and is academically defensible". It did not give students an unfair advantage, since it was taken into account in marking, although it should be used in conjunction with other exam methods.

The polytechnic directorate had less than friendly relationship with the CNAA for some time, with PNL arguing for more independence, and the CNAA saying the academic and administrative procedures were neither as good as the polytechnic thought they were, nor good enough.

The ILEA inspectorate added its criticisms to the polytechnic's structure - which the directorate is in the process of reorganizing - in its report on PNL, presented to the authority 10 days ago.

The inspectors said academic organization at department level was good. But they agreed with the CNAA view that the polytechnic needed better communications, and more power devolved from the directorate to the senior staff and committees, particularly the course approvals committee and academic board.

They also said the polytechnic and the CNAA should investigate what happens in the changeover period between an old and a new degree, so that students do not suffer. The PNL directorate's reaction to the criticisms was polite scepticism; devolved power would not necessarily unite departments, and might have more or less success in protecting the polytechnic from another future. But

Five new issues have replaced bias at the top of the PNL agenda. Karen Gold reports

them took their case uninvited to Dr Kerr's office, and persuaded him that this year's finals, subject to council approval, should be carried out with the themes. Next year is still an open question.

So, presumably, are all the degrees in other institutions using this practice which the CNAA continues to validate. The CNAA was implicated in the allegations at PNL, from the start, not least because they were presented with the dossier of allegations at their final visit to the departments to validate the new degrees - which they did with enthusiasm.

As soon as the HMI's criticisms were published, the CNAA was faced with two questions to answer. Why had it validated two degrees subject to so much criticism, and if its verdict was so different from the HMI's, who was right?

Sir Keith's letter to the ILEA made clear who he was inclined to believe. It said he was considering a general inquiry into the design, teaching and validation of degree courses, because of the issues raised by the two PNL degrees. The CNAA said it would be happy to cooperate with a broad inquiry, but not one restricted to PNL.

With that threat on the horizon, the CNAA has embarked on its new, controversial and government-encouraged role of advising the National Advisory Body on the relative quality of public sector departments.

The question the CNAA rather than HMI raised was the ability of the polytechnic's management to discover real or alleged problems in its departments, and deal either with them or the allegations.

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in its response to ILEA, for the authority to use when writing back to Sir Keith, the polytechnic outlines some of the administrative changes it is making. Its very first point dealt with perhaps the most far-reaching issue arising from the PNL affair: that of access.

The two departments had thought the number of non-traditional students (that "long tail of low achievers") they admitted was up to them. According to the PNL paper to ILEA they were mistaken. "It has now been made clear that this right (to decide to numbers) is explicitly reserved by the academic board in line with polytechnic policy," the paper says.

Previously the intake of students without traditional qualifications into the two departments had averaged 10 per cent for sociology and 30 per cent for applied social studies. According to the heads of the two departments, the polytechnic has now said that any non-traditional entry over 15 per cent must be approved by the academic board. But both the new degrees were designed to increase the proportion of non-traditional entrants, their heads of department say, in sociology to 25 per cent and in applied social studies to 50 per cent.

There were two reasons for that: the ILEA's policy of increasing access, and the departments' own argument that they had succeeded in teaching such students. Hence their resentment of two assertions and two conclusions drawn from the HMI report.

The labelling of unqualified students as "poor achievers" and the criticism of the casual atmosphere are both rejected by the departments as a failure to understand such students by the inspectors. More resented is the implication in the report and repeated by the inspectorate, that if such students are taken into higher education, they must either produce a high drop out rate during the course, or a high failure rate at the end.

Neither has happened at PNL. There are two possible answers. One, implicit in HMI's comments about spoonfeeding of students and explicit in the attacks on pre-circulation of exam themes, is that students are getting degrees when they do not deserve them. That has been rejected by the polytechnic and the CNAA.

The other answer, implicit in the HMI's comments that work by fourth year students they saw was of an impressive standard, and the departmental statistics that show all their first class degrees to have been gained by students without A levels, is the fact that the two departments are teaching students others cannot reach.

A battle over the issue of access for non-traditional entrants might produce some very interesting alliances: the CNAA and the inspectorate on one side; ILEA and the NAB board - whose chairman Mr Christopher Ball has been touring the country preaching access - on the other. All of them, like all these other issues, and moves still in the future like Sir Keith's inquiry, would end up being political.

Meanwhile applications to read sociology at PNL are up 70 per cent this year. Applications to read applied social studies are up 100 per cent. The applied social studies department, where one person left in the previous three years, has received the resignations of 31 members of the 32 staff in the last year.

Conscientious objectives

David Jobbins looks at Natfhe's plan to encourage peace studies in colleges

Sir Keith Joseph may have his reservations about peace studies as a subject in its own right but college lecturers are planning to overcome the academic obstacles being placed in its way.

The National Association of Teachers in Further and Higher Education has authorized the establishment of a peace and conflict studies section as part of its battery of specialist subject groupings.

Its organizers, whose plans go to an inaugural meeting next month, hope to provide ways of encouraging the subject in its own right as well as its complementary role in other areas. And they have already secured indications of support from more than 130 lecturers at up to 40 colleges.

The new section has its origins in the union's internal debate over affiliation to the Campaign for Nuclear Disarmament. Many supporters of affiliation, dropped at last year's annual conference, now recognize they overestimated the strength of feeling among the union's silent majority.

All that remained was a coda to the disaffiliation motion adopted in Blackpool committing Natfhe to work for increased understanding of association policies on peace and disarmament among its 76,000 members.

In effect, Natfhe reverted to the policy adopted at its 1981 conference in Bournemouth which called for consideration of ways of promoting educational policies based on the "ideals" of peace and disarmament, and to develop curricula for education for peace.

It also drew attention of teacher educators and validating bodies to the importance of education for peace within teacher training programmes. Many union activists who a year later supported CND affiliation now realize that it was an unfortunate and damaging diversion from practical efforts to implement this policy.

Acting secretary of the new peace and conflict studies section, Mr Dave Edye, says: "We thought after Blackpool that it was necessary to keep the momentum going - but we see it as much wider than the issue of CND."

The subject sections - Natfhe has another 26 including two provisionally created at the same time as peace and conflict studies - exist to provide forums for discussion among practising teachers on academic developments and shared experiences in each field.

They are an arm of the union in its other role as a professional association of educators from low level further education right through to first degree level and beyond into the realms of teacher and lecturer training.

Inherited largely from the former Association of Teachers in Colleges and Departments of Education, they are given the task of developing and broadening activities to increase their relevance to all members of the union. They may be established to cover any subject area provided the initiative is

supported by at least 50 Natfhe members.

Although the sections are largely autonomous, their aims and objectives have to comply with the association's overall policy. For peace and conflict studies the proposed aims, to be considered by the inaugural annual meeting in Nottingham early next month are:

- To provide guidance to members wishing to set up courses in this area;
- To evaluate resources and facilitate their exchange and development;
- To encourage the incorporation of this subject across the curriculum.

Its objects, also subject to consideration at the inaugural meeting are:

- To enable students to see their own understanding of peace and conflict in a world context;
- To promote education methods which are compatible with sharing and co-operation;
- To seek safeguards and maintain standards which ensure the validation of such courses.

Geoffrey Gornall-Thode, one of the initiators of the plan, is adamant that critics of peace studies as an academic subject in its own right are wrong.

"It is a viable subject," he says. Insisting that it is necessary to put practical flesh on the idealistic bones of conference policy, he adds: "We are being more concrete if we attempt to promote peace and conflict studies as an idea within different areas of study in the colleges. We believe it permeates political thinking, education, history, psychology - and even aspects of science and engineering."

The organizers hope that peace studies, currently offered at only a handful of public sector colleges, will be recognized as a substantive subject, available across the spectrum from non-advanced to advanced further education and externally validated to guarantee academic respectability and public credibility.

Worried that the original title - simply peace studies - might be considered lacking in objectivity and would prove unduly restrictive, the steering committee is proposing that it should be extended to include a reference to conflict studies.

Ironically, it is a title shared with the syllabus promoted by the Government-backed British Atlantic Committee. While the BAC proposal might be regarded as worthy of consideration, its uncritical acceptance of the value of deterrents is regarded as a lesson in itself by the section organizers.

One underlying anxiety is that the initiative will be regarded as an attempt by unilateralists to get round last year's conference decision to disaffiliate from CND.

David Edye says emphatically: "We have to be clear - this is not a CND front. Affiliation is not on the agenda for the inaugural meeting but I would speak against it if the issue was raised."

BUSINESS AND TECHNICIAN EDUCATION

On 2nd March this year, *The Times Higher Education Supplement* published an 8 page feature on business and technician education. Among the contributors to this report are Mr H. N. Raine, Chairman of the Business and Technician Education Council, Sir Robert Telford, Chairman of Marconi, and Dr George Tolley, newly appointed Head of Quality at the Manpower Services Commission.

This feature is now available in reprint from price 80p. To obtain your copy please send a cheque/postal order (no cash please) made payable to *Times Newspapers Limited*, to

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Harlaxton: a monstrous, magnificent folly.

Americans learn the English lifestyle

At the end of a mile-long drive surrounded by acres of Lincolnshire parkland with a lake and a lily pond, stand the ornate towers and turrets of a Victorian dream palace. This is Harlaxton College—one of the least known universities in Britain.

Seventy-five per cent of the students are American and the rest international. Yet they hold joint seminars with British universities, drink wine and eat cheese with English undergraduates and, in one case, are associate members of their student union.

Harlaxton is the British campus of the University of Evansville, Indiana, but it has forged links with institutions here on several academic levels. And this summer a symposium on thirteenth century English studies, organized in conjunction with academics from Cambridge, Nottingham and Leicester universities will be held in the imposing grade one listed house.

Dr John Waller, senior lecturer in history at Loughborough University believes there are great benefits in the joint ventures. His third year students of American history hold seminars each semester with undergraduates studying English history and political science at Harlaxton. They cover American views of British life and institutions, the role of the individual in the British and American political process, monarchy and presidency and other subjects which provide for academic and historical comparisons.

"Harlaxton is the British study centre of an American university. American history is too often seen through British eyes and through mixing with the US students the subject becomes more alive," said Dr Waller, who is impressed by the showmanship and insight of the Harlaxton students.

Joint activities are also taking place with Nottingham University's department of American studies and both Nottingham and Leicester open their libraries to Harlaxton students for reading and research.

Jane Last

Unhappy graduate snapshot

The latest figures from the Association of Graduate Careers Advisory Services hold out gloomy prospects. John O'Leary reports

Last week's report by the Association of Graduate Careers Advisory Services provided an interesting snapshot not only of a declining employment market, but also of the changes which took place in higher education during the first three years of Conservative government.

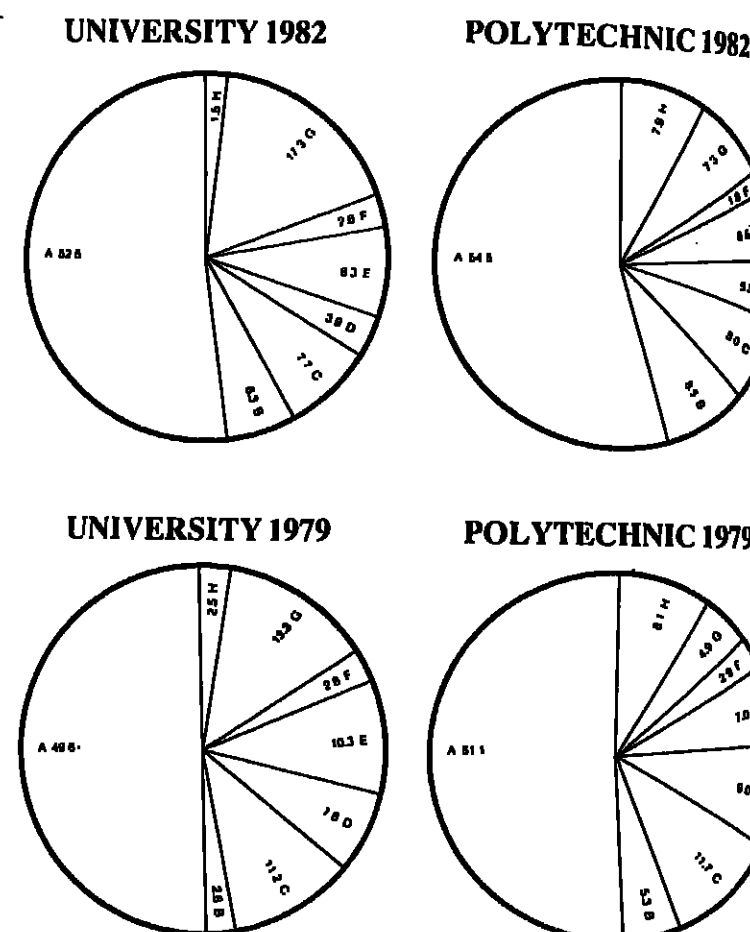
The AGCAS booklet *What do graduates do?* has not appeared for three years due to an absence of sponsorship, and the gap has served to underline the combined effects of recession and spending cuts. Although the authors go out of their way to stress the continuing value of a degree, the survey paints an unhappy picture of the prospects facing graduates in 1982, compared even with recent counter-parts.

It is likely that the last cohort of graduates will have fared slightly better and that the position will be noticeably improved this year, but it seems that the range of options available in 1979 have narrowed for the foreseeable future. The trends which show up in last week's report, both between subjects and occupations, will remain valid.

With the exception of a sharp rise in unemployment, most of the changes are less than dramatic, but they are sufficient to give the lie to any notion of an unchanging higher education system and to store up further ammunition for the opponents of manpower planning. Not only does AGCAS estimate that one third of job opportunities were and are open to graduates in any discipline, but changes had taken place in many subjects which could not have been predicted during the student careers of those covered by the latest surveys.

Places in teacher education and further academic study, for example, had become more scarce by the time the "class of '79" graduated. The decline in both areas was slight overall, but in a subject such as English it was important. More than a fifth of graduates went into teacher education and one in 10 began other postgraduate courses in 1979; by 1982 the proportion was little more than 15 per cent for teacher education and below 5 per cent for further academic study among polytechnic graduates. Largely as a result of these changes, the unemployment figure on both sides of the binary line almost doubled, reaching 27 per cent for the polytechnics.

Other subjects hit hard over the period were chemical engineering, mathematics, chemistry and languages, most of which appear to have been victims of the recession and



Key: A: Permanent UK employment B: Short-term UK employment C: Further academic study D: Teacher training E: Other training F: Overseas employment G: Unemployed H: Not available

shifting employment trends. In chemistry, for example, the unemployment rate six months after graduation had soared from 3.8 per cent in the universities and 15.1 per cent in the polytechnics to 15.1 per cent and 19.3 per cent respectively in three years.

But the polytechnics do not come off worse in all subjects. They are slightly ahead of the universities both in terms of numbers going into permanent employment and in keeping graduates off the dole in business and management studies, and in many engineering and science subjects a higher proportion of students go on to take permanent jobs. In some cases, such as mathematics and computing, this has been the case for some time because of the polytechnics' emphasis on more applied work.

The AGCAS statisticians warn against reading too much into the bald figures, particularly those for unemployment. Mr George Buckton, the editor of the booklet, says: "Quite a lot of young people quite deliberately at the end of their course take time off and don't want to go straight into employment or research. It probably has been six years of hell for them and they are wrung out at the end of it." The association does not have the money to

produce a longer-term study but suspects that the jobs figure would fall substantially in a follow-up survey.

Expectations obviously vary according to subjects as well. Strongly vocational subjects, such as engineering or law, always show high percentages going into jobs, while it is becoming accepted in subject areas such as art and design or social work that a period of unemployment is likely while graduates gain the experience necessary to secure a full-time post.

Other subjects experience cyclical changes according to the state of the economy. Civil engineering is a prime example, with prospects improving again recently. Manufacturing employers (apart from electronics firms) have been recruiting more slowly but can be expected to pick up if the economy improves, while Government cuts have restricted opportunities in the public sector and the armed forces.

Fields already showing increased demand are accountancy (taking a surprising 11 per cent of all graduates), computer-related work, banking, insurance, administration and research in scientific and technical fields. Black-spots include jobs directly related to biological and environmental sciences.

the report says.

The picture for 16 to 19-year-olds shows similar though significantly less acute trends to the picture for 16 to 17-year-olds.

As a result of the survey, the IEA has also discovered that some employers who have taken up MSC funding for their employees are still sending them to colleges as nil fee-paying day release students. The Post Office or British Telecom is believed to be one of the offenders. One of them — and the IEA will not reveal which — has now admitted this was an oversight at local level.

But as the report points out there are difficulties in finding offenders, although a great deal of effort is being made to identify students so that employers can be informed, many trainees are unclear about their status or may be guided by their employers/sponsors on how to answer questions.

Neil Fletcher admits IEA is extremely concerned at the discovery because it is unclear how long it has been going on and how many employers are involved. The authority estimated that its known number of YTS students totalling some 6,000 could rise to 6,000 if all real YTS trainees were identified. It is now working with the MSC towards a more effective penetration of the employed.

When the lines become blurred

How do the arts and sciences fare each side of the binary line? W. O. George and B. C. Thomas report on their comparative survey of publications in 20 universities and polytechnics

The proper balance and level of endeavour between the two broad cultures encompassed within higher education has been the subject of considerable public debate. Many current activities are not easily divided into these traditional categories by virtue of components of intuitive skill as well as quantitative rigour but higher education institutions are typically made up of departments and faculties which teach, research and practise arts (as understood to include humanities, social studies, business, education, art and design) or sciences (including the many engineering and technological subjects).

Here there are variations in terminology depending on academic boards, the line being drawn between the fundamental traditional sciences and practical or applied subjects in engineering or other technological areas. Science and engineering are frequently treated synonymously (eg Science Museum, Department of Education and Science and the various science parks on university campuses) although the Finniston report makes a strong case for a distinction in terminology and such representations led to a change of title by the Science Research Council to the Science and Engineering Research Council. Nevertheless the term science will continue to have an umbrella connotation for organized knowledge associated with tangible materials.

Some academic areas such as geography and architecture have been long rooted in arts and sciences and the evolution of disciplines in terms of the forces leading to growth or decline is likely to proceed at a greater pace in the future than in recent decades, of which the decade of the 1970s merits particular study of academic activity.

Twenty higher education institutions have been selected for comparison of number of publications over 10 years in the two academic areas. The institutions are equally divided between universities and polytechnics and are of generally similar size. They also represent a wide geographical selection within the UK. In Scotland there are no formal polytechnics but Paisley has been selected as one of the institutions with polytechnic characteristics.

The most striking feature of the comparison of the total number of publications in the arts and in the sciences shown in the table below and of the growth of the numbers of publications in each area is the close similarity in the relative numbers in the universities and polytechnics and the parallel growth patterns between these areas.

Contrary to conventional belief the proportion of arts to sciences is higher in the polytechnics (42.2 per cent) than in universities (41.5 per cent). There

are wide variations between institutions but the table represents a large fraction of the total academic output of the 1970s from the UK.

There are obvious pitfalls in simply counting publications. A publication is not a measure of achievement in itself but is the result of a piece of work which has reached a level of acceptability by a journal or publisher for subsequent peer review assessment of its contribution to knowledge. Further, there are variations in the time scale covered by successive reports leading to publications being counted more than once in some institutions. Different areas vary in tradition, style and resources for research. It is therefore the relative numbers in arts and sciences between universities and between polytechnics that are worth consideration. The data given in the table is taken from institutional reports covering the period 1970-1979 which are the subject of some editorial control over criteria for inclusion reflecting different practices between the arts and sciences. Thus the proportion of reviews of single works or of general areas found to be generally higher in the arts while the proportion of publications of totally new information is generally higher in the sciences. Some detailed analysis indicates the proportions of different categories of work are similar for arts and for sciences in different institutions.

The style of research between the arts and sciences is dominated by its funding particularly for studentships and equipment associated with higher degree work. The two main agencies are the Economic and Social Science Research Council (ESSRC), formerly the Social Science Research Council, and the SERC with respective current budgets of £2.0 and £7.8.

Other public and private funding is also heavily weighted on the side of the sciences. This weighting reflects the view of successive governments that the growth of national wealth is fostered by funding based as a mix of potential serendipity and dirigisme in the areas of science and engineering. The body advising the Government on this balance (the Advisory Board for the Research Councils) has recently become more open in its considerations and therefore more amenable to public representations on the relative merits of all different forms of research.

The distribution of the SERC budget revealed by successive annual reports shows that among the 20 or more committees the biology and chemistry committees allocate the largest number of grants and studentships. These areas have highly developed communities for judging excellence by peer review processes. It is significant that the proportion of these resources allocated to polytechnics over the years is typically 1-2 per cent.

The funding by the SERC of areas designated in terms of a judgment on

Number of reported arts and sciences publications 1970-1979

Institution	Arts	Sciences	Institution	Arts	Sciences
Universities			Polytechnics		
Bangor	2,161	2,575	Hatfield	209	850
Bath	1,638	2,584	Huddersfield	1,185	559
Belfast	2,445	5,105	Kingston	707	820
Durham	2,720	2,705	Leeds	488	884
Kent	1,560	1,590	Oxford	803	872
Leicester	3,077	4,577	Paisley	213	868
Salford	834	4,888	Plymouth	407	1,090
Stirling	1,632	1,455	Sunderland	492	948
Warwick	2,457	2,481	Wales	384	751
York	2,919	1,958	Wolverhampton	408	274
Total	21,833	30,756	Total	5,277	7,244
Percentage	41.5%	58.5%	Percentage	42.2%	57.8%

Correction

We apologise for a number of misprints in Professor A. C. Crombie's article "What is the history of science?" published in *The THES* on 27 March 2. The following should read: col 1, para 7, line 12, "society or culture"; col 4, para 1, line 15, "negotiation, from magic"; col 7, last para, line 13, "music without music"; col 8, para 2, "neomaxist"; para 6, last line, "counterparts"; para 7, line 8 "philosophy, from antiquity".

The ascription should have read: "This article is the full text of the introduction given from the chair to the session on the history of science at the Colloque: Histoire des Idées, Histoire des mentalités: à la recherche du 'troubisme' nerve, organized by Dr Bruno Neveu, director of the Mouton Française, University of Oxford, and held there on September 22 and 23 1983." Professor Crombie's *Styles of Scientific Thinking in the European Tradition* will shortly be published by Duckworth.



WENDY HOLE

national need rather than a community demand is the province of a directorate rather than a committee. As an example, the Teaching Company Directorate has allocated about one third of its funds to polytechnics and two thirds to universities in recent years.

It would seem probable that funding which is reactive to work the scientific community funds necessary is likely to be harder to win than funding which is proactive to work identified by industry or government. The recent report of the Advisory Council for Applied Research and Development on improved research links between higher education and industry argues for a better balance between fundamental and applied research which should be achievable not by undermining excellent research or scholarship of any kind but rather by reallocation of work which is less urgent, important, interesting or is in worked out areas.

Some overseas academics see this apparent classification of research into a first division of fundamental work and a second division of potentially applied work as a peculiarly British attitude. Difficulties exist in identifying which of the publications listed in the table represent work worth perpetuating because of intrinsic excellence and which should be replaced by more applied work other than by the forces of supply and demand of resources.

Two features of comparison between universities and polytechnics are worthy of comment. First, the proportion of work between arts and sciences: it is generally believed that polytechnics are relatively stronger in sciences than arts. This was written into their *raison d'être* and was a feature of their parent colleges and it is a firmly held belief of many members of the Council for National Academic Awards on both sides of the cultural divide.

This belief is firmly embedded in a recent draft policy statement on research and related activities published by the CNA. This is true in absolute terms but it is not true relative to university research which in turn reflects wider national and international perceptions.

It is possible that there is a larger gap between the arts and sciences publication reports than in the universities but a very detailed study of the respective publications reported would be needed in support of this view. It is more likely that the strength

of university science and technology sharpened by hard competition for research council funds is underestimated by those in the maintained sector who believe research achievements should be demonstrated fairly evenly across an institution.

The second feature is the general observation that universities report many more publications than polytechnics. This is not surprising in view of some of the relevant factors. First, comparison of courses and departments reveal some material which is similar but much more that is different and lacks identity with research funding and higher degree work in the way established subject areas are displayed in universities. Second, the dual funding policy of the University Grants Committee permits similar undergraduate unit cost in universities as in polytechnics but provides an extra 25 per cent for research which is the seed corn for further funding from the research councils and other sources. The third factor relates to the distinctive style of universities and polytechnics and may best be described in terms of the establishment and role of senior academic staff.

In traditional subjects such as biology or chemistry nearly every university will have separate departments each typically with more than one professor each appointed in terms of high academic ability. Within many larger departments, professional appointments approach double figures.

There are relatively few separate biology or chemistry departments in polytechnics and the proportion of senior staff is required to be much lower in number and salary by the respective negotiating machinery. The Burnham report has permitted more than one post on the head of department scale within a department for over 10 years but only one such appointment has been known to the authors.

Within university professional ranks, managerial or administrative duties such as head of department, dean, vice principal or pro-vice chancellors are frequently shared by rotation for short-term periods and the managerial role is secondary to the academic role in the majority of cases. Typically all academic staff below principal/vice chancellors have a teaching and/or a research role.

The factors operating on polytechnics produce a different ethos in which senior staff are head of department (or school), dean, assistant director and deputy director. Also a course has an important identity with a course leader occupying a position of high responsibility. These posts are defined largely in management or academic leadership terms to which teaching and research is secondary to responsiveness to many agencies.

The large number of agencies through which local authority maintained education operates generate greater numbers of planning and policy issues than on the university side of the binary line. Universities may be able to afford a greater emphasis to academic activities leading to a more pragmatic evaluation of the kind of material students receive and the framework within which they receive it.

From a selection of 10 of the institutions of similar size the average number of senior academic staff was 52 in the universities and 25 in the polytechnics in the year 1979/80. Over the decade they were listed as each publishing an average of 15 and 22 publications respectively in the university arts and sciences areas and six and four publications in polytechnic arts and sciences areas.

These comparisons of senior staff raise questions on style of institutions in terms of the institutional balance between academic work and management. Should this be tipped one way in universities and the other in polytechnics. Are universities under-managed or polytechnics over-managed? Should senior academic staff continue to be academically active whilst assuming responsibility for institutional management or does the latter activity require a different dedication to the kind understood by the academic?

These are important questions if one accepts that the ethos of an institution influences the attitudes and abilities of young people who determine the future well-being of society.

The authors are head of department and full-time research student respectively in the department of science at the Polytechnic of Wales.

Report reveals not-so-different patterns of provision

The YTS has not eased the financial burden of local authorities, as was anticipated. Patricia Santinelli reports

One of the main planks of the Manpower Services Commission's and CBI's case in negotiating low fee rates for the Youth Training Scheme with local authorities has been undermined by a new Inner London Education Authority report on 16 to 19 provision. The report, which might have had some impact on negotiations taking place last Friday, shows that contrary to expectation young people who would normally have attended traditional further education courses have not been transformed into YTS trainees, and therefore there has been no reduction to the financial burden of local authorities and their colleges.

Last year the prospect of such substitution resulted in the YTS fee rate per hour being discounted by approximately 30 per cent. It was then anticipated that YTS in addition to creating extra places under substantially altered arrangements would also significantly affect the pattern of provision in maintained colleges.

But the IEA report shows that not only has there been a shortfall in YTS places, and no decrease in total

further education participation, but there has been a substantial increase in the number of young people attending part-time day release courses. By the end of this academic year this was anticipated to rise by some 41 per cent amounting to nearly 3,000 youngsters compared to just over 2,000 in 1982/83.

According to Mr Neil Fletcher, the chairman of IEA's further and higher education subcommittee, this is probably the first factual information presented by a local authority showing that substitution has not worked.

The report's comparison between the number of 16 and 17-year-olds between 1982/83 and 1983/84 is slightly complex because enrolments for this year are not yet completed because many part-time students enrol on a termly basis. But IEA has estimated that part time figures will increase by some 35 per cent by the end of this academic year.

When the part-time figures are adjusted upwards to allow for the estimated increase to the end of the year (see table) the total part-time 16 to 17 population is some 1,330 out of a total

Mode of attendance	1982/83	Actual 1983/84	Percentage Change	Projected figs. 1983/84	Percentage change from 1982/83
Full Time	10,046	9,269	-7%	9,269	-7%
Short Part Time	771	283	-63%	382	-50%
Sandwich	329	322	-2%	435	+32%
Block Release	1,795	1,587	-12%	2,277	+27%
Part time day Release	2,118	2,217	+5%	2,293	+11%
Part time day Release and Evening	1,967	1,714	-13%	2,314	+18%
Part time day and Evening	3,173	1,832	-42%	2,473	-22%
Evening	413	408	-1%	551	+33%
Evening	3,502	2,634	-25%	3,556	+1%
Correspondence	78	121	+55%	28	-64%
Link	2,940	2,018	-31%	2,724	-7%
Unclassified	—	152	—	203	—
TOTAL	27,132	22,557		27,207	

Comparison for 16 and 17 year old students

of some 27,207. Last year it was 16,315 out of a total of 27,132.

As the table shows there has been a noticeable shift from long and short full time courses — some 57 per cent less than last year — to part-time day release, up by 4 per cent and part time day and evening up by 33 per cent. Only 671 YTS trainees are actually included in the "release" mode of attendance, therefore do not

account for a very significant proportion of the increase, since some YOP students were previously coded under these headings. "Without taking account of the YTS trainees therefore it seems clear that there has been a real increase in 16 and 17-year-old students attending college on a part-time basis released by employers. The anticipated substitution does not seem to have taken place."

The author is registrar of the University of Strathclyde.

Golden Venice

L'Incoronazione di Poppea
by Monteverdi
Royal Academy of Music

The spirit of Venice currently intoxicating the nation's art cognoscenti has barely moved any of our opera companies to present one of the great products of the early Venetian public theatre. Glyndebourne will mount a new production of the epoch's masterpiece, Monteverdi's *Coronation of Poppea*, during its Golden Jubilee Festival this summer – though in the dated orchestral fancy-dress of Raymond Leppard's edition – but in London, only the Royal Academy of Music has taken upon itself the task of suggesting a link between the painting and opera of Venice's Golden Ages.

In a stylish seventeenth-century Venetian setting by Gius Mostari and John Otto the academy students have performed a public service. They did so back in 1969 by giving this great opera its first London performances, pipping Sadler's Wells Opera to the premiere by more than two years, in a scholarly edition by the conductor Stuart Bedford. This year on February 23, the RAM mounted the opera in the "authentic" realization by the American early baroque specialist Alan Curtis. Its first airing in this country – and confirmed the ability of Monteverdi's music to stand on the sparse of instrumentation: a varied continuo of chitarone, cembalo and regal and modest use of strings and winds to accompany the emotional peaks, the tragic monologues of the Empress Ottavia, the despairing trio of Seneca's friends and the sensuous counterbalancing duets of the page and handmaiden, of Nero and Poppea herself.

Curtis's edition pays the greatest dividends, however, in its disposition of the vocal parts by restoring them, as closely as possible to original pitch. A tenor Annalisa, Poppea's nurse, inevitably enhances the comic opportunities

the role presents to its protagonist. Peter Brander, one of the academy's most promising lights, grasped them eagerly and with the producer, Gius Mostari – from Glyndebourne incidentally – created a brilliant portrait of a domineering Southern Italian matron. Apart from a tendency to press on his tone in the lullaby – a more exacting piece at tenor pitch – his singing would have graced any professional stage.

No less accomplished vocally, Timothy Wilson's vacillating counter-tenor Ottone, Fiona Lamont's radiant Drusilla, Jane Welster's desperate-looking Virtue – the opera is, after all, about the triumph of Love and Fortune as the Prologue tells us – and Brindley Sherratt's grave Seneca upheld the high standards which pertain at the academy.

If Gail Mortley's singing of Poppea, opera's first "grande horizontale", is yet not mustered the expressive vocabulary of her body language, she nevertheless fulfilled the "physique rôle" to perfection and Anthony Rich created an interestingly contrasted, musically controlled Nero, though no tenor can do justice both to the neuroses of the Roman Emperor's psychology and to the overtly sexual musical symbolism of the final duet. Octave transposition robs the intertwining vocal lines of their ravishing physical tensions and transforms this crowning moment into little more than a romantic love duet. At least here it proved the natural climax of Mostari's acutely observed staging as Nero slowly climbed John Otto's imposing staircase to join the triumphant Poppea in impassioned embrace. Nicholas Cleobury's committed musical direction and vivid playing from an appropriately scaled baroque ensemble contributed vitally to the performance, a glorious occasion by any standards and a fitting culmination of John Street's adventurous years as Opera Director.

Hugh Canning



Eileen Atkins and Karl Johnson as Gertrude and Paul Morel in the BBC production of *Sons and Lovers* scripted by Trevor Griffiths and first broadcast in 1981. *Sons and Lovers* can be seen in its entirety at the National Film Theatre on March 24 as part of a season of Griffiths' television writing.

Common clay...

Potters do not expect to get rich and few do. They have socialist traditions, on the whole hope that long hours and hard slog will be compensated by the rhythm and integrity of a chosen life-style and the freedom of independence. Only they do need to earn enough to live on.

Teaching is one answer, another is busking with a commercial enterprise. Janice Tchalenko teaches two days a week – at the Royal College and Cumberwell and at present she is designing a new range for Dartington, for which she will eventually receive royalties. After six years producing wholesome, chunky, utility pots, she became influenced by Matisse and in the second half of her career she has established a distinctive image with highly decorated, brightly coloured upmarket domestic ware. Continual development, she feels is important, with contemplative interruptions from the treadmill and a willingness to diversify within the field. Potting for successive exhibitions is an enormous strain because at one resource always at full stretch is time.

Stephen Llewellyn turned potter five years ago after a degree in mechanical engineering and brief disillusionment at British Leyland. He gained production experience at Billingshurst Pottery but knew nothing about the formulation of glazes, or the intricacies of a gas kiln when he set up alone. He sells everything at a modest profit although he works up to an eighty-hour week with thirty weekends a year at Craft Shows. In the circumstances half a day's teaching at Sutton College of Liberal Arts has been more of a relaxation than anything else.

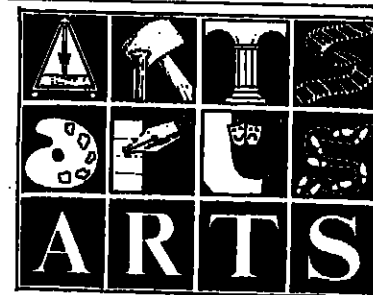
Does he resent the struggle? Not unless financial restrictions threaten to cramp him. Tchalenko won a John Ruskin bursary administered by the Craft Council; Llewellyn has so far managed without assistance.

It is difficult to discuss pottery collectively because one is talking about studio artists as well as the traditional artisan, and over the last ten years, as the market has swung away from the purely functional to sculptural, one-of-a-kind pieces, the distinction has grown. Yet all work against the innate limitations of clay; even the studio potter's work seldom commands the price of other materials.

So how can their wages reasonably be assessed? Among craftsman potters form the largest full-time group, the only significant one able to live from their work, and the craftsman's average annual income according to the Crafts Council's independent survey (1983) is a sobering £3,250 for men, less than £1,800 for women. It is dangerous to make comparisons in the wider world, but both know their own worth. When Llewellyn left Leyland to become an apprentice potter his income dropped to a quarter. Tchalenko has a twin brother in the Civil Service: she works twice as hard, she reflects, for a mere portion of his salary.

On the other hand, Emmanuel Cooper, potter and editor of *Ceramics Review* suggests that a suitable comparison would be with poets. Both make conscious options, rejections and value judgments; social, ecological and artistic. Perhaps in the end what is important, if society wants art and craft to be significant, is that we are aware of the dedication, the idealism and the strains. Being a potter is not cosy or complacent, it is obsessive, compelling and often stark.

Sally Festing



emphasized in David Emmet's production (except for a finely conceived death scene), because few of the actors other than Morynne Kane as the Queen intimated the depth of panic behind their glacial politeness. For her the experience of living with Ivona became an unbearable journey to self-knowledge; she clutched desperately at court protocol to save her self-defence. The performance was brilliantly pitched between high comedy and menace.

It is this barely disguised sense of panic the Gombrowicz and Witkiewicz exploit most creatively; to miss it is to miss the essence of their style of theatre.

Richard Allen Cave

"Witkacy" by Daniel Gerould is published by the University of Washington Press at £23.50. A production of Witkiewicz's *Gyubal Whazur* by the Witkacy Ensemble will be at the University of Essex's Theatre Underground on April 5-8.

Concerts:

Tomorrow, University of East Anglia. University choir with the English Symphony Orchestra conducted by Peter Cook (baritone). Elgar's *Enigma Variations*, Wharton's *Belshazzar's Feast*. Tomorrow, University of Warwick. Warsaw Philharmonic Orchestra conducted by Kazimierz Kord, with Andrzej Kijka (violin). Szymanowski, Beethoven and Tchaikovsky.

March 20, University of Essex. Gabrieli String Quartet: Haydn, Beethoven and Dvořák. March 20, Church of the Holy Name, Manchester. Manchester University Choir and Symphony Orchestra with Manchester Grammar School Boys' Choir and the RNCM Sinfonia Ensemble. Britten's *War Requiem*. March 22, University of Lancaster. John Clegg (piano); Beethoven, Chopin, Fauré and Liszt. March 22, Brunel University, Uxbridge. String Quartet.

Other events: To April 7, Contact Theatre, University of Manchester. H. G. Wells's *The History of Mr. Polly*, adapted by Andy Rashleigh. Tonight and tomorrow, Riverside Theatre, New University of Ulster. Triple bill: Yeats's *Purgatory*, Charles Safo's

Working with Colour: recent paintings and studies by Bridget Riley. To April 12, Talbot Rice Art Centre, University of Edinburgh. Sea Papers: new work by John Hansard Gallery. To April 28, John Hansard Gallery, University of Southampton. Photographs by Julia Margaret Cameron (1815-1879). To April 29, ICA, London. William Morris Today.

New exhibitions: From tomorrow, Art Gallery, Oxford. Matisse: illustrations to the "Amour" of Pierre de Ronsard. From Monday, North Staffordshire Polytechnic. Photography exhibition: Focus on Stoke. From March 30, Spinkshire Centre, University of East Anglia. Alberto Giacometti: the last two decades. Over 70 sculptures, paintings, drawings and prints.

Events

Continuing exhibitions:

To March 23, University Gallery, University of Leeds. Drawings by George Fuller (1923-73). To March 26, School of Architecture, University of Liverpool. Surface Matter: paintings and prints by Nicholas Waygood. To March 27, University College, Aberystwyth. Head and Masks by David Tinker. To April 1, Library, University of Warwick. Work in textiles by Bédouin. To April 8, March Art Gallery, Sheffield. Ten Twentieth-Century Hotters. To April 8, DLI Museum, Durham.

A concern for man's moral character

by R. W. Burkhardt, Jr

Just Before the Origin:
Alfred Wallace's theory of evolution
by John Langdon Brooks
Columbia University Press, \$39.00
ISBN 0 231 05676 1
Alfred Russel Wallace:
biologist and social reformer
by Harry Clements
Hutchinson, £8.95
ISBN 0 09 153270 1

Alfred Russel Wallace (1823-1913) is most often remembered as the co-discoverer of evolution by natural selection. Biogeographers also know him as one of the great pioneers of his field. Wallace's interest as an historical figure, however, does not end there. While championing the most important contribution to biological thought in the nineteenth century – a contribution which he generously called "Darwinism" – and while advancing the study of the geographical distribution of animals, he also promoted a variety of unorthodox scientific and social views.

He was committed to phrenology, spiritualism, and socialism. He advocated the nationalization of land. He called for the economic independence of women. He challenged the government's claims about the efficacy of vaccination. Unlike most of his contemporaries in science, he had no illusions that moral character was restricted within the boundaries of race or class. Typical of Wallace was his observation in 1855: "The more I see of uncivilised people, the better I think of human nature on the whole, and the essential differences between so-called civilised and savage man seem to disappear."

The most familiar part of Wallace's story runs something as follows. In March of 1858, Wallace, then in the Malay Archipelago, sent to Charles Darwin a manuscript essay entitled "On the tendency of varieties to depart indefinitely from the original type." When Darwin received Wallace's manuscript, he was stunned. Wallace had independently come to the same basic conclusion regarding the mechanism of organic change that Darwin had reached 20 years earlier but had not yet revealed to the public.

Darwin had been warned by Charles Lyell in 1856 that he might lose his priority claims if he did not publish soon (Lyell had been impressed by an 1855 paper by Wallace in which Wallace discussed the appearance of new species but offered no explanation of how they originated). Darwin found himself in 1858 writing to Lyell: "Your words have come true with a vengeance – that I should be forestalled. If Wallace had my MS sketch written out in 1842, he could not have made a better short abstract!"

Lyell and J. D. Hooker arranged for not only Wallace's new essay but also extracts from Darwin's unpublished writings to be presented at the July meeting of the Linnean Society of London. Darwin's priority claims were thereby secured. With some haste, Darwin proceeded to write out an abbreviated version of the long, still incomplete manuscript on "Natural selection" on which he had been working since 1856. This "abstract" was published in 1859 under the title *On the Origin of Species*.

Brooks's *Just Before the Origin* is a detailed analysis of the development of Wallace's ideas on evolution until 1858. More painstakingly than any of Wallace's previous biographers, Brooks shows how the development of Wallace's evolutionary ideas related to his particular discoveries and concerns as he explored the Amazon and the Malay Archipelago. Brooks's ultimate thesis, however, is not only that Wallace arrived at his understanding of organic evolution independently of Darwin, but also that Darwin's exposition of his own theory, both in the long manuscript version and in the *Origin*, owed significantly more to Wallace than Darwin ever allowed. Brooks believes that Darwin received Wallace's 1858 essay as much as a month before Lyell about Wallace's paper, and that Darwin wrote up new material on the principle of diver-

gence, the importance of which he had not truly appreciated until reading Wallace's essay.

Brooks's thesis is no longer new. Brooks himself began working on it some fifteen years ago. That Darwin received Wallace's manuscript earlier than he said he did has been suggested by H. Lewis McKinney (*Wallace and Natural Selection*, 1972) and maintained by Arnold C. Brackman (*A Delicate Arrangement*, 1981). The latter expounds Brooks's idea that Darwin got from Wallace the principle of divergence – the idea that species not only change over time but also become more and more different from one another. Darwin acknowledged quite openly in his autobiography that in his early theorizing he overlooked the important problem of divergence. He never suggested, however, that the source of his understanding of this problem was Wallace.

Brooks cites mail schedules between the Dutch East Indies and England to support his claim that Darwin received Wallace's manuscript well before he said that he did. Brooks also dwells at length on parallels between Wallace's comments on evolutionary branching and Darwin's additions to his long manuscript to show that Darwin's thoughts on divergence derived from Wallace. The circumstantial evidence Brooks assembles, however, is presented without attention to the complete range of information available on the development of Darwin's views on evolution, natural selection, and divergence. The result is a book that is conspicuously one-sided.

Brooks's bias is obvious, for example, in the "relevant chronology" for Wallace and Darwin that he provides at the end of the book. The first entry for Wallace is 1845, the date by which Wallace, having read the anonymous *Vestiges of the Natural History of Creation*, had become a believer in evolution. The comparable date for Darwin should surely be 1837, by which time Darwin, back from his *Beagle* voyage, had come to believe in the mutability of species and had opened his first notebook on the subject.

Brooks, however, does not provide an entry for Darwin for 1837, or for 1838 (the year in which Darwin hit upon the idea of natural selection), or for 1842 (the year in which Darwin wrote out a 35-page manuscript sketch of his views). Instead, the first entry is 1844, the year in which Darwin produced a 231-page manuscript exposition of his theory (which Brooks somewhat disingenuously identifies as an essay on the "possibilities" of organic change). Similarly, Brooks follows Darwin's "tree of life" diagram in the *Origin* back to Darwin's notebooks, assuming instead that its source was Wallace's 1855 paper, although Darwin noted after reading this paper: "[Wallace] used my simile of tree."

Lancelot Hogben in 1918 and A. J. Nicholson in 1960 pointed out that

BOOKS



Alfred Russel Wallace (oil over photograph by Thomas Sims, about 1863/66).

Darwin and Wallace in fact had different views of how natural selection works. Briefly, Darwin's view emphasized relative fitness, with individuals competing against each other, while Wallace's was more a view of fitness with respect to the environment, with individuals and varieties either measuring up or not to "the attacks of the enemies and the vicissitudes of the seasons." Not surprisingly, Darwin and Wallace offered different explanations of divergence (a point made convincingly by David Kahn in his trenchant review of Brackman (*Science*, volume 213, 1981)). Brooks recognizes that Darwin and Wallace did not have the same explanation of divergence. Rather than develop the important topic of the theoretical differences, he reloaded in the fascinating scientific disagreements that Darwin and Wallace had with each other through the course of their careers, however, Brooks sticks doggedly to the issue of priority. He does so even though the theoretical differences just mentioned argue more for independent discovery than they do for unacknowledged borrowing.

The arrangement worked out by Lyell and Hooker at the Linnean Society did do Wallace something of an injustice. Wallace's name came after Darwin's in the joint communication to the Linnean Society; his completed paper was preceded by extracts from Darwin's writings. Darwin felt

guilty about this arrangement – as his correspondence shows – and was embarrassed by his own concern for priority. Wallace had sent him a manuscript, and the result was a joint publication in which it was established that Darwin had had the idea of natural selection first. Non the less, the primary debt Darwin owed to Wallace still seems to have been the goad to activity with which Wallace's 1855 and 1858 essays provided him, not the formulation of any particular concepts.

Clements' book concentrates on Wallace's later work, arguing that much of this work was an elaboration of Wallace's special insight that the development of man's brain was an evolutionary event without precedent in the history of life. It is worth noting that as yet there has not even been produced a reasonably complete and accurate list of Wallace's publications (the bibliography in James Marchant's *Alfred Russel Wallace: letters and reminiscences* is distressingly unreliable).

Although neither Brooks's nor Clements' new book on Wallace satisfies the needs just identified, each in its way is likely to secure a wider appreciation of selected aspects of Wallace's overall intellectual achievement, and each makes important points which are bound to stimulate further work.

Richard W. Burkhardt, Jr is associate professor and chairman of the department of history at the University of Illinois at Urbana-Champaign.

Heroic struggles

It began with a Stone: a history of geology from the stone age to the age of plate tectonics by Henry Faul and Carol Paul. Wiley, £35.00 and £16.00. ISBN 0 471 89733 3 and 89605 5

A rift has been opening in writing about the history of science. Specialist historians alleged that scientists are guilty of hindsight, viewing the past through the spectacles of the present. Scientists, for their part, find the monographs of academic historians of science all too often narrow and irrelevant, failing to conjure up a past to which they can relate. The result is that few satisfactory broad surveys are written any more; the best general histories of geology (for example, by von Zittel and Geikie) were published before the First World War.

This book is quite explicit in being history, written by geologists for geologists: as the late Henry Paul puts

it, "my view is perforce from the present". The resulting text hardly probes the questions historians might put (in what intellectual context did Hooke develop his ideas, what exactly did Lyell mean by uniformity, and so on); rather it concentrates on how the figures of modern geology came to be put together, piece by piece, highlighting the "contributions" of great pioneers (Hutton "set geology on its course").

There is nothing wrong with this emphasis, so long as it's well done. And the Pauls' book scores well. It is well-informed, it draws upon a rich range of primary and secondary sources, and it rattles along with anecdotal pen-portraits of the protagonists (the authors have a soft spot for practical geologists like Agricola). The book is well illustrated, and it prints generous extracts from original texts. Admittedly, it offers nothing by way of original interpretation or new facts, and skates over some of the more crucial conceptual transformations in the science. Yet it makes a real advance on previous surveys. For one thing, national chauvinism is avoided: geology is treated as a genuinely international enterprise. For another, it is good to have full coverage given to

the latter part of the last century, particularly the contributions made by American geologists.

Two faults, however, detract from the value of this work: First – and rather oddly in a book written by practising geologists and billed as going up to plate tectonics – the present century is utterly short-changed. Developments since Alfred Wegener on continental drift get a mere five pages out of 230. There is no petroleum geology; William Morris Davis is not even mentioned. Second, the book perpetuates the myth that the history of geology is essentially a series of heroic struggles whereby science emancipated itself from religion. No one would deny there were tussles; Buffon was indeed hauled before the theologians of the Sorbonne. But the Pauls exaggerate the role of religion in retarding the development of geology. For example, they slight the work of John Woodward as mere "pseudo-science" which attempted to prove the Flood; yet they omit to discuss how he applied Newtonian physics to geology, how he demonstrated the organic origin of fossils, or how he pioneered the idea of stratigraphical order. Similarly they call William Buckland's inaugural lec-

ture "a defence of the Noachian Deluge", whereas in reality it was mainly a defence of geology against sundry detractors, including ecclesiastical bigots.

Sometimes they even use the absence of science versus religion conflict to advance their case. They note how Moro's progressive geology was not condemned by the eighteenth-century church; that proves, they conclude, he must have had friends in high places. Viewing the emergence of geology in terms of scientific heroes and religious villains is a gross oversimplification. Thus James Hutton, a hero, is praised for his uniformitarianism, but no mention is made of the fact that Hutton himself presented his geology as derived from fundamental theological truths.

Despite these shortcomings, this is an informative and highly readable book, which can be recommended to geologists interested in their science's past.

Roy Porter

Roy Porter is lecturer at the Wellcome Institute for the History of Medicine, London.

BOOKS

Dissident French

Social Inequality and Class Radicalism in France and Britain
by Duncan Gallie
Cambridge University Press, £22.50 and £6.95
ISBN 0 521 25764 6 and 27700 1

Recent social theory has been preoccupied with industrial society, and its presumed characteristic structures and behaviours. On closer inspection, industrial society turns out to be a mid-Atlantic nowhere, whose features bear a close resemblance to those of the United States and Britain, given spurious universality by the presumed requirements of "industrialism". Duncan Gallie has never fallen into this trap of transposing particular findings into universal propositions, tied together by a more or less abstract sociological theory.

In his first book, *In Search of the New Working Class*, he documented the differences between French and British workers employed in the oil refining industry, showing contrasting attitudes to work, trade unionism, and management; nationality was a more important source of variation than technology, even in attitudes to work. In *Social Inequality and Class Radicalism in France and Britain*, he develops and extends his theme by showing the differences between French and British workers in attitudes towards social inequality, and towards the political system. British workers are shown as having a relatively high degree of satisfaction with the overall structure of society – unlike the French.

From detailed research among four groups of oil refinery workers (in the early 1970s) and later but less rigorous, and more extensive, national surveys, Gallie concludes that French workers resent social inequalities more deeply than British workers. Both French and British workers see society as divided on class lines, but French workers are more likely to identify themselves spontaneously as members of the working class and more likely to place themselves in the lowest social class. British workers are more likely to see social inequality as inevitable, and as irrelevant to their personal concerns, than French workers. French workers



Families bring food to strikers occupying a factory in St Denis, Paris in 1936

are more likely to express their resentment in political terms, although the politics are reformist rather than revolutionary.

The reasons for the French workers' heightened resentment and political consciousness lie in their experience of authoritarian management on the shop floor and in the ability of French left-wing parties to foster awareness of the connection between industrial authoritarianism and politics. "The greater radicalism of French workers would appear to reflect the success of the French left-wing parties in building upon the sharp class resentments generated by the experience of work under a system of authoritarian managerial control."

French management is able to manage autocratically because French governments have permitted them to – until the Mitterrand government there had been little successful pressure from unions on French governments to curb management autocracy. Trade union weakness is due to the disinclination caused by placing divergent political objectives before effective collective bargaining.

The survival of the French radical working-class tradition has not been

due to the persistence of the revolutionary tradition – Gallie emphasizes the discontinuities between the spirit of 1789 and that of the Communist Party; nor to the transfer of rural radical traditions to urban areas; nor in the uneven development of French capitalism.

Instead, Gallie points to the French government's rejection of a positive political role for labour in the First World War, and in the postwar reconstruction, as the crucial factor. The French government refused to offer any incentives to an explicitly reformist union leadership, at a time of widespread unrest, and in doing so provided the opening for a split in the French labour movement in circumstances which favoured the Communist Party.

This book is, as the title implies, concerned more with France than with Britain: the discussion of the British labour movement is very limited. Gallie portrays a set of mutually reinforcing institutions and attitudes in France which preserve management autocracy and worker radicalism. The portrait is persuasive, although the attitudes of the 1980s may well differ from those of the 1970s in both countries.

But the explanations presented are less so. The period 1918–20 was a crucial one in the history of Europe – in Britain as elsewhere. In Britain, as in France, the role given to labour was only a walk-on one, which ended when this similar experience, the subsequent development of the French and British labour movements were very different.

French and British workers are very different from each other – in their attitudes to social inequality and politics, and in much else. The reasons for the differences lie in history and social experience. But which aspects of the history and which elements of experience are decisive remain opaque. Gallie's book is a model of careful analysis, combining sociological imagination and a careful reading of French social history. But he is better at showing the inadequacies of previous explanations than presenting alternatives.

Roderick Martin

Roderick Martin is fellow in politics and sociology at Trinity College, Oxford.

Speaking for a generation

Contradictions of the Welfare State
by Claus Offe
edited by John Keane
Hutchinson, £14.95 and £6.95
ISBN 0 09 153430 5 and 153431 3

The "crisis of the welfare state" is, by now, a familiar catchphrase. It has, over the past ten years or so, provided the theme for countless academic conferences and political speeches, and no doubt will continue to do so. The discussion has, indeed, settled down into a predictable routine: a debate in search of new arguments and new ideas. It is therefore with some expectation that one turns to Claus Offe's book in the hope of finding fresh insights. For Offe is something of a cult figure: a German sociologist who builds on Marxist theory, the Frankfurt School and American political science. It is a combination which surely should generate intellectual fireworks.

Yet the first impression left by this collection of essays, written at various times over the past decade, is one of déjà vu. This, it is tempting to conclude, is an example not of intellectual fireworks but of the endless striking of damp matches (as Virginia Woolf said about Henry James). For Offe's analysis of the "crisis of the welfare state" as he himself recognizes is remarkably similar to that of the New Right.

In effect, the welfare state, Offe suggests, destroys its own economic base. It depends on economic growth to finance its own expansion, yet its

demands weaken the capacity of the capitalist system to deliver the goods. The capitalist system depends on labour being treated as a commodity, yet as citizens we insist on being treated as individuals: thus the logic of the economic market and that of the political market pull against each other. The expansion of the Keynesian welfare state thus undermines – through regulation and taxation – the dynamic of the market system on which it depends.

In turn, Offe argues, this weakens the political base of the welfare state. The development of the welfare state helped to legitimate the capitalist system (as well as being a necessary instrument for producing an acquiescent, healthy and trained labour force) by demonstrating that the acquisitive society was compatible with a caring society. Once growth stops, politics becomes a zero-sum game. This helps to explain, Offe further argues, why the traditional political parties are losing ground both to corporate interest groups like the unions and employers and single-cause, populist pressure groups like nuclear disarmament and ecologists, since they can no longer regulate demands and conflict by means of the dividends of growth.

All this is, of course, fairly familiar ground. So, too, is Offe's critique of the welfare state as over-bureaucratic and over-paternalist, thereby generating rather than relieving dependence. What distinguishes his analysis is his insistence that what we are witnessing is not just a temporary crisis of adjustment but a fundamental "contradiction", a word about which he worries great deal. The welfare state, as he understands his argument, is both essential to capitalist society and destructive of it, and the outcome will be the survival of the welfare state or of capitalist society.

In putting forward this thesis, Offe presents himself – in an illuminating interview with the editor of this book, printed as the final section – as an exponent of "critical social theory". This, he asserts, is distinguished from "liberal social science" by its willingness to question the existing distribution of power: "Critical social science knows that the criteria for the validity of statements cannot be determined by the latest press release of a 'great government'".

The arrogance of this statement illustrates the fundamental weakness of Offe's work. To put it bluntly, it lacks scholarship: there is no sense of historical context or differentiation between the experience of different countries. If there were, he might be more cautious in generalizing both about liberal social science (whose historical origins lie precisely in its challenge to the *status quo*) and about the "contradictions" of capitalist society (which in reality splitters into a variety of country-specific experiences).

Instead, as we hack our way through the thick jungle of Offe's prose, we get abstract nouns in search of concrete facts. The welfare state becomes a reified abstraction; there is no room for Offe's approach for differentiating between countries and no recognition of the way in which policies have been incrementally adapted over the past few years to a changed economic environment. Moreover, when it comes to considering what is actually happening in the world around us, we are often left with phrases like "many observers agree" – which simply prompts the reaction that many observers disagree.

In many ways, therefore, this is a disappointing book. Its appeal derives not so much from its analysis – a mixture of familiar conclusions and incantatory noises about "contradictions" – as from its qualities as an intellectual autobiography. Offe's book is perhaps best read as the testament of a lonely, humane West European intellectual, attempting to reconcile his youthful enthusiasm for Marxism as a student in the sixties with the complex, uncertain world in which he finds himself. As such he speaks for a whole generation of now aging radicals who are seeking to reconcile their vision of a more humane society with the realization that state socialism, and who are attempting to find a way out of the "contradictions" in their own original stance by espousing eco-socialism, workers' control and participation.

Rudolf Klein

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BOOKS

MATHEMATICS AND PHYSICS

Ideal science?

The Nature of Mathematical Knowledge
by Philip Kitcher
Oxford University Press, £15.00
ISBN 0 19 503149 0

Professor Kitcher has set himself the task of accounting for the nature of our mathematical knowledge. The account he proposes has most in common with the traditional empiricism of J. S. Mill but differs in at least three important respects.

First, Kitcher believes that it is impossible to understand either the basis or the content of contemporary mathematical knowledge without paying proper attention to the detail of the history of mathematics. Second, while Mill is famous for the view that mathematical truths are simply well-entrenched laws concerning the actual behaviour of material bodies under certain physical operations, Kitcher holds that our knowledge of mathematical axioms, while it originates in perceptual knowledge gained by our remote ancestors, invariably involves idealizations. Last, Mill's views were never developed beyond elementary

arithmetic, whereas Kitcher treats also of geometry, analysis, and set theory.

Nearly the first third of Kitcher's book is devoted to an attempt to set off once and for all the opposing a priori and a posteriori strategies in the theory of knowledge in order to show that a priori knowledge, when correctly analysed, requires a level of surety to which our ordinary mathematical knowledge cannot aspire. Whether true belief is knowledge depends, according to the received wisdom, on the process whereby it was acquired: for example, no matter how well I can support a true belief, I will probably not count as knowing it if it was a result of, say, hypnotic suggestion. Since many of the propositions which tradition regards as known a priori can also be known empirically, it becomes incumbent upon the a priorist to say what is distinctive about those processes which culminate in a priori knowledge. A first thought is that such a process had better be feasible, in principle, for anyone who possesses certain relevant concepts, irrespective of the course of his or her experience. The tricky question is how the first thought should be supplemented.

Kitcher suggests adding that a proposition known a priori should be true in any "life" in which the germane process is feasible; and that execution of the process should always warrant belief in that proposition. The first addition is uncontroversial for a priorist knowledge of necessary truths – a priorist tradition takes mathematical knowledge to be. But the second is tantamount to the condition that on a priori warrant have that status independently of context, and it is this condition which Kitcher argues is failed by the sort of intuitive and deductive processes in which a priorist

ism reposes confidence.

The condition can seem plausible enough, since we do not ordinarily think of the status of a mathematical proof, say, as depending upon background conditions which may vary: being a proof is, as it were, a purely internal property of the proof. That is not "same, however, as suggesting that whether it is reasonable to regard something as a proof cannot be a function of context; on the contrary, it can be perfectly reasonable, in the presence, for example, of authoritative advice, to reject something which is in fact a proof. Kitcher takes it that a priori warrant, properly understood, cannot be so defeasible. This conclusion seems to be the result of a refusal to recognize these distinct interpretations of the absoluteness of a priori warrant. However that may be, Kitcher's discussion at least highlights the point that the task of providing a worthwhile account of a priori knowledge within the sort of epistemological framework currently in favour is very much outstanding.

The force of Kitcher's positive empiricist proposals need not, of course, be contingent upon the fate of his attempted refutation of a priorism. Essentially, his idea is to regard arithmetic, for example, as descriptive of the arithmetical operations of an ideal agent, a conception we arrive at by abstracting from the accidental limitations – including finitude – of our own performances. Kitcher develops this thesis with no little sophistication, particularly in extending it to set theory and analysis. But whatever its strengths as a framework for the interpretation of classical mathematical theories, there are certain difficulties about its claim to be empiricist which Kitcher never satisfactorily addresses. Perhaps most obvious,

idealization is – as Kitcher is well aware – a stipulative business. Experience can tell us about the actual behaviour of gases, say, but it can suggest laws for ideal gases only after we have determined the *direction* of idealization. Why then is Kitcher's philosophy of mathematics not better described as "conventionalist" than empiricist? Kitcher seems to be encouraged to overlook the question by his disregard for the distinction between our knowledge of the truth of geometrical axioms, for instance, and our knowledge – empirical no doubt – that the idealizations which they incorporate are empirically fruitful.

The book has two other major shortcomings and one major strength. The shortcomings are, first, the absence of any attempt at a worked-out empiricist philosophy of logic, despite the purported demonstration of the global impossibility of a priori knowledge and the well-known difficulties which global empiricism encounters over our recognition of the soundness of novel chains of inference; and, second, Kitcher's complete failure to come to terms with that tradition in the philosophy of mathematics which disputes the very existence of mathematical "facts", and hence of mathematic-

al knowledge properly so described. (It is rather as if someone were to write a treatise on ethics which prevented intuitionism and naturalistic accounts as the sole possibilities.) Kitcher's low opinion of the later work on mathematics by Wittgenstein, the most powerful representative of the "no facts" view, is on record elsewhere; if his own account cannot in the end be distinguished from a form of conventionalism, that will be a fitting nemesis.

Kitcher's great strength is that he does know a considerable amount about the history of mathematics. The concluding chapter, on the historical development of analysis, demonstrates that, whatever philosophers may think about the nature of mathematical knowledge, its actual evolution has been a thoroughly pragmatic business. This chapter is probably the best thing in a book which, if not persuasive of its central philosophical theses, deserves careful attention and should prove a useful aid to both teaching and study.

Crispin Wright

Crispin Wright is professor of logic and metaphysics at the University of St Andrews.

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Values in practice

Social Work Values: an enquiry
by Noel Timms
Routledge & Kegan Paul, £5.95
ISBN 0 7100 9404 3

In the last decade or so the moral issues raised by the practice of social work have received much more attention than was the case previously, at least since the decline of the influence of the Charity Organization Society in the early years of the century, a body whose approach to social work had the great redeeming merit of being based on an explicitly articulated moral theory.

Noel Timms has been a prime mover in the recent development, sponsoring studies in the Library of Social Work which he edited and more explicitly in the series edited with David Watson in the International Library of Welfare and Philosophy. The present book has been eagerly awaited because it contains his own mature reflections upon themes which up to now he has been more concerned to help others to explore. This is a particularly valuable development because as a philosophically aware teacher and practitioner of social work, he has been able to argue about values in a way that takes space to those in the field, whereas space to these issues by philosophers can seem very abstract and remote from the concerns of practitioners.

Social workers have, of course, always talked about values and most schools of social work, apart from the most assiduously behaviourist, have given their own particular interpretation to those values which are central to the profession – individualization, self-direction, acceptance, non-judgement.

But attitudes and so on – but these values were never discussed in a very thoroughgoing way. Timms raises a range of questions about the values which social workers hold. He discusses the nature of values, their relation to preferences, wants and reasons for action, the place of values in the traditions of social work, and the relationship between social work values and those held in the wider society within which social work operates. One particularly valuable feature of this book is the way in which he shows how values are crucial to understanding major controversies about the practice of social work, taking as case studies the dispute between the Charity Organization Society and its critics, the disagreements between the functionalists and those of the diagnostic school, and more contemporarily, the dispute over whether there can be a coherent Marxist approach to social work.

These disputes are shown to turn on different views of the nature of persons and their flourishing and, in the light of this, different accounts of the range of possibilities open to social workers and their agencies to facilitate the achievement of those qualities in clients. This is valuable in a number of respects. It shows the centrality of values to disputes which might otherwise be thought of as differences about technique and expertise; it demonstrates in concrete cases that social work is predicated on moral assumptions of one sort or another and cannot conceivably be adequately represented by models drawn from management science; organization theory or medicine; and, in the case of the COS, his arguments about their individualism and limited view of the possibilities of political action in the field of social reform may stimulate some interest in the history of social work about which many practitioners are woefully ignorant.

Timms also looks at some unpleasant

facts about social work values in the face – that some of the most uplifting, such as respect for persons, may yield no positive guide to action at all unless linked in ways which are notoriously difficult to pin down, with other more specific values. He also discusses the role of paternalism and manipulation in the practice of social work-features which are usually rejected because they are not part of the generally accepted pantheon of values but which may nevertheless be ineliminable from social work practice.

The book does have some drawbacks. The more philosophical section towards the end, dealing with general ethical theories – deontology, teleology and axiology – are not explained fully enough to be intelligible to non-experts and his own moral stance, which is a kind of principled eclecticism owing something to Dorothy Emmet but not very fully explained, and his final paragraphs on the relationship between values and social practices are extremely opaque. However when dealing with specific issues such as conscience, self-direction, respect for persons and manipulation Timms has a great deal of good sense to impart. The author tells us in the preface that the book was financed by means of a grant from the Economic and Social Research Council; they have obviously spent the money wisely. The whole tenor of the book should give those who wish to concentrate social work education on matters of training and expertise pause for thought.

Social work is not just an instrumental technique but is shot through, and rightly so, with moral considerations without which the expertise exists dangerously in a moral vacuum.

Raymond Plant

Raymond Plant is professor of politics at the University of Southampton.



Niels Bohr and Albert Einstein photographed by Paul Ehrenfest in Leyden in 1933. From *Quantum Theory and Measurement*, a collection of 49 original papers illustrating the meaning of quantum theory as it is disclosed in the measurement process. Edited by John Archibald Wheeler and Wojciech Hubert Zurek, with an introduction and supplementary annotated bibliography, the book is published by Princeton University Press at £65.00 and £16.80.

Statistics in practice

A Biologist's Basic Mathematics
by David R. Causton
Edward Arnold, £7.50
ISBN 0 7131 2879 8
An Introduction to Statistical Modelling
by Annette J. Dobson
Chapman & Hall, £10.50 and £5.95
ISBN 0 412 24850 6 and 24860 3

To understand biology nowadays you have to understand some mathematics. David Causton may overstate the importance of quantification: "In the last resort the phenomena of nature can only be explained in the precise terms of mathematics". But undoubtedly this is sufficiently true to justify an expanded edition of the elementary part of his earlier book *A Biologist's Mathematics* (Edward Arnold, 1977). And yet, in his omission of any serious discussion of statistics, he ignores some of the fundamental principles on which the application of mathematics to biology is based.

The book is clear, concise, and cogently illustrated with the kinds of circumstances in which biologists have to use mathematics (though the examples are mostly botanical). The main

topics are multi-dimensional space, calculus, differential equations, matrices, and logarithmic and exponential curves; trigonometry, perhaps in-adequately, is absent. Causton writes well and is particularly eloquent in his description of the broad biological meaning to be given to the different parts of a mathematical model.

But this link with application is also where the book's main weakness lies. There is a ritual obedience to the crucial role played by statistics in biology, but little more; this despite frequent reference to (for example) fitting growth curves; and to the inherent variability of biological material. Statistics is not a decoration that can be added on to basic mathematics; indeed, the very meaning of the mathematical quantities we define and try to estimate in biology. Causton's book can certainly be read with profit by biologists, but not in isolation.

Annette Dobson's introduction to generalized linear models, though ostensibly more concerned with practice, suffers from something of the same problem. Generalized linear models are valuable in nearly every science in which statistics is used, and the mathematical theory outlined by Dobson unifies a range of techniques which have evolved gradually over some 60 years: analysis of variance, multiple regression, logistic regression, probit analysis, and contingency tables. Indeed, I found her book at times quite exhilarating: her brevity is the sign of her mathematical elegance.

Moreover, her enthusiasm for elaborate mathematics sometimes obscures the essential simplicity of the principles involved. Thus, in several examples a straightforward *t*-test, or even an unsophisticated inspection of a graph, would lead us to the same conclusions as her more general theory; and in the data on achievement scores on page 70 there is no need to adjust for initial aptitude, as she does, to show that the training methods are effective.

And she occasionally omits to mention some conditions that ought to be checked, such as that a covariate should be independent of the treatments we are investigating. Thus, to take the same example, if the training methods had been modified to suit the initial aptitudes then we could not distinguish their effects from the effects of those aptitudes.

Nevertheless, Dobson partly gets around the restrictions of space by giving (unlike Causton) full, and reliable, recommendations for further reading. In particular, she frequently refers to P. McCullagh and J. A. Nelder's much more detailed book *Generalized Linear Models* (Chapman and Hall, 1983). Here, then, is to be read less as a statistical textbook than as an introductory essay for mathematicians. If you come to it with that in mind, you will find that it gives a good flavour of a fascinating and useful theory.

Lindsay Paterson

Lindsay Paterson is a member of the scientific staff at the AFRC Unit of Statistics at the University of Edinburgh.

A collection of articles by I. J. Good on a wide range of questions about the foundations of statistical inference, especially where induction intersects with philosophy, has been published as *Good Thinking: the foundations of probability and its applications* by the University of Minnesota Press at \$35.00 and \$14.95.

BOOKS

MATHEMATICS
AND PHYSICS

Hunting of the quark

The Cosmic Onion: quarks and the nature of the universe
by Frank Close
Heinemann, £12.00 and £5.95
ISBN 0 435 69170 8 and 69171 6
Quarks: the stuff of matter
by Harald Fritzsch
Allen Lane, £12.95
ISBN 0 7139 1533 1
The Quest for Quarks
by Brian McCusker
Cambridge University Press, £7.95
ISBN 0 521 24850 7

"Three quarks for Muster Mark" wrote James Joyce in *Finnegans Wake*, not suspecting his play with words would give Murray Gell Mann a name for the basic stuff, with the electron, forms ourselves and all the matter in the universe. The investigation of the smallest particles of matter and the forces governing their behaviour — usually called particle physics — enlarges our understanding of the principles underlying the structure of the physical world. These three books set out to give non-specialist readers an appreciation of recent advances in this field which promise dramatic insights into the origins of matter and the possible fate of the universe.

This story began nearly a century ago with J. J. Thompson's discovery of the electron, followed in the early 1900s by Rutherford's penetration of the atom to reveal its tiny nucleus, about a hundred thousand times smaller in diameter than the atom itself. By the 1930s the nucleus was known to be a closely packed assembly of protons and neutrons stuck together by a strong force not encountered in physics before. All that then remained to be done, it seemed, was to unlock the secret of this new force. But by the late 1940s and 1950s optimism gave way to confusion and, by the early 1960s, even despondency as the experiments intended to solve the problem of the strong nuclear binding force only yielded an endless stream of new particle states. There was a strong reluctance, surprising now, to accept that this multiplicity of states is a sign that the protons and neutrons are not "elementary", as we still believe the electron to be, but have an internal structure.

Even Gell Mann at first hesitated, introducing the quarks in 1964 more as a mathematical convenience than as "real" constituents. After all, no one had "seen" a quark, with its characteristic signature of an electric charge one-third, or two-thirds, that of the electron's. Confidence in quarks was established by a remarkable series of experiments in the late 1960s and early 1970s using beams of very high energy particles (electrons and neutrinos) to probe the proton's inner structure. In almost exact analogy with Rutherford's experiments on the atom, these disclosed the presence of point-like constituents within the proton and neutron possessing just the characteristics expected of quarks.

The direct observation of quarks, however, still eludes us: we can knock electrons out of the atom, and protons and neutrons out of the nucleus, but as yet there is no conclusive evidence that quarks can be liberated from their imprisonment within the proton and neutron even in the most violent collisions. This may be because they are trapped by a force generated by a new sort of charge called "colour" (analogous in some ways to electric charge) which is carried by the quarks. A theory of this "colour-force", called quantum chromodynamics, leads naturally to quark confinement and so to the absence of "free" quarks. The colour-force is also responsible, indirectly, for the binding of protons and neutrons in the nucleus, at last answering the question posed 50 years ago.

Frank Close guides the reader skilfully through these discoveries with a lively and attractive approach. Although his use of elementary mathematics is sparing and not essential, he becomes rather more adventurous when he reaches the unification of the electromagnetic and weak forces. The weak force is responsible for the radioactive decay of atomic nuclei, and also for the first step in the fusion of hydrogen to form helium in the sun, the source of the sun's energy. Nearly one hundred years ago Maxwell brought electric and magnetic phenomena together in one mathematical framework. Now the next great unification treats Maxwell's electromagnetism and the weak force as just different aspects of a unified "electroweak" force in a theory almost completely established by the discovery of the W and Z bosons at the European Organization for Nuclear Research (CERN) a year ago, but too recently for more than a passing reference in the book. Here Close asks us to follow some elementary manipulation of matrices (a piece of modern mathematics which these days should be within the reach of most readers) and interestingly illustrates the great power of mathematics as the language of physics.

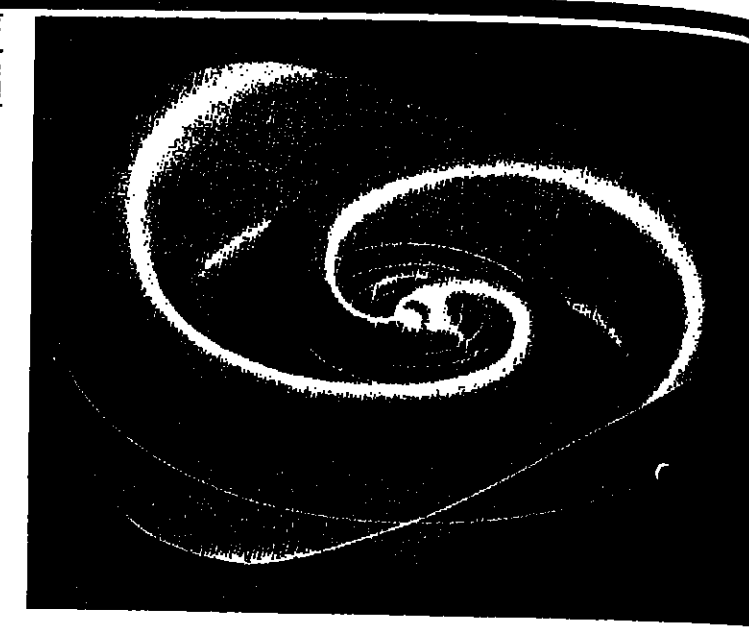
Our present picture of the electroweak force and the colour-force suggests they too may have a common structure and in the closing chapters speculation races ahead of experiment to contemplate the prospects of this further "grand unification" in our understanding of the forces of nature. Now some truly dramatic issues come into view, such as the very existence of matter in the universe: of stars, planets and objects such as ourselves. The "big bang" model for the origin of the universe leads one to expect, at all times, equal amounts of matter and anti-matter. However, there is no evidence of significant amounts of anti-matter in our universe; and, more strikingly, at a very early stage in the universe the equal numbers of quarks and anti-quarks should have mutually annihilated leaving nothing but radiation; we shouldn't be here at all. The grand unification, if achieved, would explain the mystery of the quark excess; it would also predict the eventual demise of all protons and neutrons and so an end to everything as we know it. The reader has to take some courageous conceptual leaps to follow Close all the way to this frontier; the view, however, is worth the effort.

Harald Fritzsch follows a very similar path. Like Close, he is a theoretical physicist renowned as a lucid exponent of the current theories, and he has made notable contributions on the nature of the colour-force between quarks. It is natural that a description of this force should be a main theme. However, although his book is very polished, fluent and well illustrated, it has some unfortunate weaknesses for non-specialists. There are a surprising number of obvious errors (such as "muon" appearing as "myon" in several places); the figure captions do not seem to have been checked; and the author sometimes slips into specialist jargon without preparation or apology. For example, the introduction of colour is a crucial step yet the author invokes the Pauli principle in a form not used in the book before, and one which most readers will find quite obscure. Nevertheless, this is a very readable book (there is no mathematics at all), which makes a valuable contribution to the task of bringing an appreciation of the excitement and significance of particle physics to a wider public.

Whereas the first two books aim to give a reasonably complete, balanced and up-to-date account of what we believe has been learnt from experiment about the nature of matter and the universe, the third is a very personal account of Brian McCusker's view of physics, especially his search for evidence of free quarks, and, finally, his struggle to comprehend the role of human consciousness as a part of the whole universe.

McCusker has spent his career experimenting with cosmic radiation and has sought evidence of quarks that might be liberated in the rare but violent collisions suffered by cosmic particles entering the atmosphere. Although some years ago his apparatus recorded something with the properties expected of a quark, it is unfortunately characteristic of experiments like these that similar circumstances cannot be repeated. Whether they repeat themselves is a matter of luck and it is often impossible to be sure that such a single occurrence is a genuine signal of a new phenomenon rather than an unusual, unrecognized example of a much more humdrum happening.

Despite McCusker's enthusiasm, his attempt to string together a number of different cosmic oddities to lend support to his belief in free quarks is unconvincing; the case remains open. The book is written in an informal, raconteur's style, and ranges widely from difficulties in the interpretation of quantum mechanics and the predicament of Schrödinger's cat, to the interest, however, lies in what we learn about its author and his approach to physics.



Artist's conception of the spiral structure of the interplanetary magnetic field, as far as the orbit of Jupiter. From *Astronomy from Space: Sputnik to space telescope*. Derived from a series of public lectures at the Harvard-Smithsonian Center for Astrophysics and the Boston Museum of Science and edited by James Cornell and Paul Gorenstein, the book is published by MIT Press at £15.75.

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Everyone with the slightest curiosity about the nature of matter and the universe must be fascinated by the story now unfolding and well summarized by Close and Fritzsch. *The Cosmic Onion*, especially, demonstrates that an appreciation of the significance of fundamental discoveries can be communicated to the interested lay-person willing to make some effort of concentration.

John Mulvey

John Mulvey is a senior research officer in the department of nuclear physics at the University of Oxford.

Fluid motion

A First Course in Fluid Dynamics
by A. R. Paterson
Cambridge University Press, £30.00 and £12.50
ISBN 0 521 25416 7 and 27424 9

Paterson's justification for adding to the large number of books on fluid dynamics is that "For a number of years at Bristol University we tried to find a suitable text to introduce fluid dynamics to second year mathematics students, and failed. I too have experienced the same difficulty. Dr Paterson has responded positively to this lack by writing such a book himself. Many students will, I believe, be grateful to him for producing this admirable account of the foundations of the subject."

There are many texts on the motion of fluids, in and out of print. Some are written for engineering students with a bias towards machinery and practical applications. Others are too comprehensive for beginners or overemphasize the importance of potential flow, or view the subject as an application of rigorous mathematical analysis. G. K. Batchelor's *Introduction to Fluid Dynamics* (Cambridge University Press, 1967) is excellent, particularly in the physical explanations of the processes involved when fluids are in motion, but it has proved too difficult for most undergraduates. What Paterson's book aims to provide is a clear description of the fundamental complexity but letting illumination come from the solution of specific problems.

The book begins with chapters containing mathematical, physical and observational preliminaries and then describes the kinematical consequences of mass conservation and vorticity. Short chapters on hydrostatics and thermodynamics lead to the establish-

ment of the Navier-Stokes equations. Simple, exact solutions of these equations are next described, before inviscid flow is treated. A variety of motions which density differences are important are then examined in four chapters on sound waves, water waves, high-speed flow and channel flow. Finally, two-dimensional potential flow using complex-variable methods is described, including some aeroflow theory.

It is immediately clear from this book that the book makes no attempt to be modern in its contents. It is what I taught over 35 years ago and most of the material is far older than that. But those who might wish to dismiss this book as another re-working of the old familiar material should remember that, even though it may be familiar to them, the student is meeting it for the first time. Also, the author is not attempting to provide more than a "first course", both to provide a sound foundation on which further study can be built and to whet the appetite for more.

The great strength of this book is that it is directed to the needs of the student. In the jargon of computer software it is "user-friendly". The material is well displayed, and readers are directly encouraged to use their eyes and their understanding on the many examples of fluid motion around them. Relevant film-loops are mentioned, and sufficient details are given to enable readers to persuade their departments that these should be made available. There are many exercises for the student to attempt, with hints for their solution — a useful innovation.

There are two omissions. Although the reader is encouraged to look at photographs of fluids in motion, there is no reference to the excellent selection collected by M. Van Dyke and published as *An Album of Fluid Motion* (Parabolic Press, Stanford, California, 1982). The other is that I should like to have seen boundary-layer theory given more than the brief mention allowed, as it would certainly have been possible to provide an introduction to this topic, at least including Blasius flow, without departing from the author's aims, and in my view they have been achieved in this book, which should appear in many universities' lists of recommended texts.

L. M. Hocking

L. M. Hocking is professor of mathematics at University College London.

A collection of essays, discussions and personal recollections, based on an international symposium on the history of particle physics held in May 1980 at the Fermi National Accelerator Laboratory in Illinois, has been edited by Laurie M. Brown and Lillian Hoddeson and published by Cambridge University Press at £27.50. Major contributors included Paul Dirac and Victor Weisskopf.

A third edition of H. J. Pain's *The Physics of Vibrations and Waves* has been published by Wiley at £18.95 and £7.50. A new chapter on wave mechanics illustrates the application of physical principles to modern physics.

BOOKS

MATHEMATICS
AND PHYSICS

Particles or waves?

The Tiger and the Shark: empirical roots of wave-particle duality
by Bruce R. Wheaton
Cambridge University Press, £22.50
ISBN 0 521 25098 6

Every student of physics knows that the discoveries of the 1890s initiated advances in knowledge and understanding so radical that everything since then is called "modern physics".

The discovery by J. J. Thomson of the electron (1897), by Becquerel of radioactivity (1896) and by Röntgen of X-rays (1895) started a revolution comparable only to Newton's, more than 200 years earlier. Anything the student is told beyond this bare statement, even under the guise of a "historical" treatment of the ideas, is likely to be a travesty. R. H. Stuewer in his book *The Compton Effect* (Science History Publications, New York, 1975) and T. S. Kuhn in the *Black-Body Theory and the Quantum Discontinuity, 1894-1912* (Oxford University Press, 1978) have shown us how difficult and prolonged was the labour of which the issue, in the mid-1920s, was the theory of quantum mechanics, the basis of all subsequent work on fundamental particles and fields, as well as theoretical chemistry and solid-state physics; and no simplification for didactic purposes will convey the atmosphere of misunderstanding and plain bafflement as the physicists tried to persuade themselves they had not given birth to a monster.

The topic pursued by Kuhn was dominated by the physicists of continental Europe, especially Germany — Planck, Einstein, Lorentz, Bohr. By contrast, Stuewer concentrated on placing in context the achievement of one man, the American A. H. Compton. Now we have Wheaton to fill in the gaps, incidentally making clear what was more implied than stated by the others, that the English-speaking and the German-speaking physicists paid rather little attention to each other from the very start, when Stokes and Wiechert independently suggested that X-rays were electromagnetic pulses produced by the slowing down of electrons on hitting a target. Both groups, by the way, managed to avoid taking much notice of what Einstein had to say. His concept of the quantum of radiation sprang from the properties of long-wave radiation, and for some years after the discovery of X-rays it was far from clear that, even if they were electromagnetic pulses (as we now found good reason to doubt), they had any affinity with the wave-trains of visible light. In any case, for the majority Einstein's quantum was the pardonable aberration of an otherwise distinguished mind.

Wheaton pays particular attention to the experiments which gradually made the basic paradox inescapable: X-rays propagate like electromagnetic waves, becoming fainter as they spread from their source, yet they are capable even at a great distance of delivering something like the whole energy of the electrons that generated them. The closely allied mystery — unintelligible from the classical viewpoint — was that, of the myriads of molecules in the gas traversed by the X-rays, only a tiny fraction should be affected.

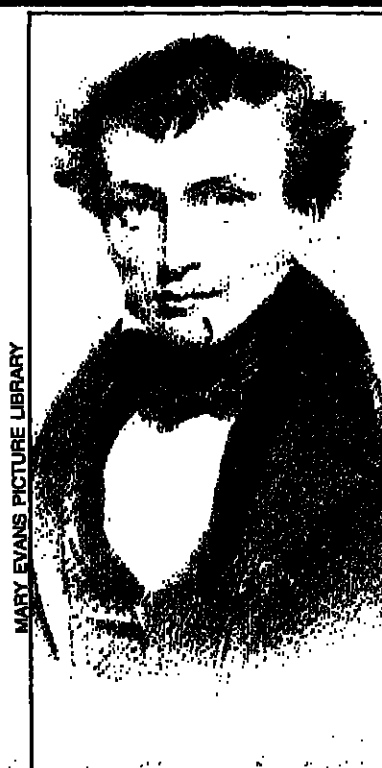
One lesson to be learnt from a detailed study like this is that only with hindsight can one formulate the paradoxes so succinctly. The obstacles to finding a solution were the imperfections of experiment (so easy to perform now, so very difficult then) and the reluctance of the mind to formulate so self-contradictory a specification of the problem. Rather strangely, one of the most important discoveries, that of X-ray diffraction, probably delayed resolution of the character of X-rays by focusing attention strongly on the wave-like side of the radiation.

Georgian optics

Optics after Newton: theories of light in Britain and Ireland, 1704-1840
by Geoffrey Cantor
Manchester University Press, £20.00
ISBN 0 7190 0938 3

The eighteenth century, we are often told, was the age of Newton. There is, however, a strange ambiguity about this label. On the one hand, adoration for "Britain's Boast", as he was called, was often expressed in optical imagery. Alexander Pope's notorious couplet, "God said, let Newton be, and all was light", is one of many such expressions. On the other hand, eighteenth-century optics in Britain did not confidently explore the territory mapped out by Newton in 1704. Historians have seen nothing but sterility and failure persisting through to the early nineteenth century — a recent student has described the story as an "age of unenlightenment". Allegedly, only with the overthrow of Newtonian particle theories in the years from 1800 to 1840 did British optics develop as a mature science. An uneasy tension persists between Newton as heroic founder and Newton as prime obstacle of optical progress.

Geoffrey Cantor offers an interpretation which does not consign Georgian optics to oblivion. He uses a sensitive mixture of sociology and conceptual analysis to display the variety of optical theory, and the vagaries of Newtonianism. The villain of this story is William Whewell, the early nineteenth-century polymath whose coinage of the term "scientist" marked a new mature role which emerged during this period. In his *History of the Inductive Sciences* (1837), Whewell mapped history in terms of his vision of such maturity, and interpreted the work of the English physician Thomas Young and the French engineer Augustin Fresnel as an heroic epoch. After Young and Fresnel, according to Whewell, the slavish loyalty to Newtonian particle theory was undermined and replaced by mature and progressive wave-theories of light. Cantor



William Whewell in 1835.

argues that here lies the root of subsequent failure to trace the real development of optics after Newton. Artificial dichotomies between wave and particle theory, the use of Newtonian dominance to explain a century of failure, and this model of a dramatic scientific revolution are all to be traced to Whewell's influential account.

Each point of the story is now challenged. There was a wide variety of optical theories in the eighteenth century, and so Thomas Young seems less revolutionary, since his views are linked with much earlier vibration theorists such as the great Swiss natural philosopher Leonhard Euler. This is re-interpretation of Young has two benefits. First, it explains why Young's contemporaries greeted him with scepticism or neglect: "recumbers have continued to ripen", wrote one of Young's reviewers in 1805, "without waiting for the legal establishment of either hypothesis". As an adherent of

Wheaton conveniently presents experiments and the interpretation they received as exactly as possible. While commending this approach, I wish he had discussed some of the theoretical points from a modern standpoint. For example, were Thomson and Sommerfeld wrong to treat the X-ray as a pulse of top-hat shape, when Stokes and Lorentz insisted that diffraction theory could only make sense if it had matching positive and negative humps? One can understand his reluctance to decide between such illustrious contenders, especially if, as I sense, diffraction theory is not one of his strong subjects. For my money, Stokes and Lorentz were wrong. Again, I should like to have seen Einstein's thermodynamical comparison of radiation with a perfect gas discussed more thoroughly than Einstein's own account, for unless one clearly understands the argument it is easy to doubt its solidity.

The bibliography of some 800 entries testifies to the author's industry. Many of them are culled from obscure journals or from letters, and some in addition are in Dutch. I have not verified that they are quoted correctly, but the style of the presentation makes one believe that this is so. The one factual statement I have found which I think is incorrect is also unreferenced — that Thomson's dissatisfaction with the trend of physics led him to relinquish the Cuvendish Chair to Rutherford. Surely the appointment to the Mastership of Trinity was not something he could have declined, or would have wished to; and in any case he would have had no say in the choice of his successor.

As usual, the Cambridge University Press have produced a handsome volume. I wish they had followed their practice in other monographs of giving references to each item in the bibliography, making it easier to trace specific points. But this is only a minor blemish on an excellent piece of historical research.

A. B. Pippard

Sir Brian Pippard is Emeritus Cavendish Professor of Physics at the University of Cambridge.

Linear algebra

Linear Algebra through Geometry
by Thomas Banchoff and John Werner Springer, DM64.00
ISBN 3 541 91787 4

Linear algebra has by now applications in many areas outside of geometry. Although this book, as the title suggests, is a very elementary but thorough introduction to the subject through geometry, it can still rightly claim that it provides a solid basis for the linear algebra required in a far broader context — in engineering, physics, biology and chemistry, and in economics and statistics.

Aimed at American undergraduates with only a knowledge of basic "high school" algebra, geometry and trigonometry, the book's slow and painstaking, even ponderous, development suggests that such readers will have no real motivation to study but a clear need to be eased gently into the subject. Though certainly far too elementary to be used in a first-year university mathematics course here, except possibly in a remedial course for those who have entered with no formal mathematical qualification but who require mathematics as a service course to their main subject, the book could prove useful at sixth-form level and possibly in colleges of higher education.

Many of the subjects covered — determinants, matrices, linear equations, linear transformations, transformation geometry — are now part of the Advanced-level syllabus. A sixth-

former who has followed this book will therefore obtain a firm foundation for a first-year university course, where the approach is necessarily more sophisticated. Although there are other good and reliable books available, and the addition of this new one is unlikely to change matters with so many badly qualified (or unqualified) teachers in charge of mathematics teaching, I can strongly recommend it to sixth-form libraries or any establishment of higher education that teaches mathematics at this level.

What the authors do is to present the main concepts of linear algebra within the familiar context of two-dimensional and three-dimensional geometry. After a nervous one-page opening chapter on vectors in the line, there is a long section of 108 pages on the two-dimensional case. All the familiar ideas are presented — vectors, linear dependence, dot product, transformations of the plane, linear transformations, two-times-two matrices, their determinants, inverses and eigenvalues, the classification of conic sections, and differential systems. This is followed by a section of a similar length on the three-dimensional case with roughly the same titles, the only difference being that symmetric matrices and the classification of quadric surfaces are covered (unfortunately without diagrams to illustrate the latter). The book ends with an attempt to move to "higher" dimensions with a short chapter on four-space and four-times-four matrices and a further extension dealing with the general case.

Alun Morris

Alun Morris is professor of pure mathematics at the University College of Wales, Aberystwyth.

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(14367)



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University of Botswana PROFESSOR/SENIOR LECTURER IN LIBRARY STUDIES

Applications are invited for the above post in the Department of Library Studies. Candidates should have a sound knowledge of library studies and a wide range of experience in the field of library studies. The successful applicant will be required to teach and supervise research in the field of library studies. The position is full-time and permanent. Salary on scale £7,190-£14,125. The appointment will be made in the lower half of the scale for three years from the first instance. Further details and application forms from: Mr. Johnson, Establishment Officer, nr. 8412 AM, Loughborough (14360)

Further particulars may be obtained from Mrs. E. C. P. Senior, Staffing Department, Southampton University, Southampton SO9 5NH to whom applications (7 copies from UK applicants) should be sent by 30 April 1984. Closing date for applications is 30 April 1984. (14363)

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Universities continued

The University of Sussex

LECTURERS IN MECHANICAL AND CIVIL ENGINEERING
In the School of Engineering and Applied Sciences

Applications are invited from qualified men and women for two permanent posts in the School of Engineering and Applied Sciences. The appointments, which will be from 1st October 1984, will be in the Mechanical and Civil Engineering Subject Group. Salary scales £27,190 to £41,240 p.a.

Send self-addressed envelope (9" x 6") for further particulars and application form to Mrs L. Vivian, Personnel Officer, University of Sussex, Falmer, Brighton BN1 9QJ. Closing date: 5th April, 1984.

University of Oxford

St Anne's College
The College is seeking a **TEMPORARY LECTURER IN ENGLISH**

For Michaelmas Term, 1984, to teach 12 hours per week on English Literature. Further particulars may be obtained from the College Secretary, to whom applications, together with the names of two referees, should be sent before 31st April, 1984.

University of Warwick and SERC Daresbury Laboratory

LECTURESHIP IN IMAGE ANALYSIS
A lectureship is available in the Department of Engineering and Applied Sciences at the SERC Daresbury Laboratory. The duties will comprise research in the field of image analysis, including development of expert systems in image processing, X-ray topography and related fields. Liaison with the user community based at Daresbury and teaching in the Department of Engineering in the area of computer systems engineering.

The appointment, which will be for five years in the first instance, will be for a salary scale £27,190 to £41,240 p.a. Further details and application forms may be obtained from the Academic Secretary, University of Warwick, Coventry CV4 7AL. Closing date: 5th April 1984.

PART-TIME PROGRAMME
Required to coordinate undergraduate courses in Law and Public Administration in America. Study programme in London. Doctorate, preferred. Salary £15,000 p.a. Applications, with names and addresses of two referees, to Box No. 5733.

Personal

IMMEDIATE ADVANCES £100 to £20,000 Written form on, no cheques. Trust Ltd., 31 Dover Street, Piccadilly, London W1A 1BS. Phone 01-491 8854 or 499 5416. L600

Faculty of Business and Management

Applications are invited for two senior appointments.

PROFESSOR/HEAD OF SCHOOL OF MANAGEMENT SCIENCES

PROFESSOR/HEAD OF SCHOOL OF ADMINISTRATIVE STUDIES

Salary Scale (both posts) Head of Department Grade VI £18,632 - £18,327

The Schools of Management Sciences and Administrative Studies are newly established as part of a re-organisation of the existing academic work of the faculty and in recognition of major new course developments in Business Information Technology and Business Administration. Both posts offer challenging responsibilities, calling for creative leadership to establish and foster these new schools.

Further details are obtainable from:

Clerk to the Polytechnic Council,

Preston Polytechnic,

Corporation Street,

Preston PR1 2TQ.

Closing date for receipt of completed applications: 6th April 1984.

PRESTON POLYTECHNIC
(14383)

2 PRINCIPAL LECTURERS

Salary: £12,519-£15,744

SENIOR LECTURERS/LECTURERS II

Salary: £7,215-£13,443

RESEARCH ASSISTANTS

Salary: £7,215-£11,568

(level of appointment and starting salary dependent upon qualifications and experience, A National salary award is anticipated April 1984)

IN THE DEPARTMENT OF COMMUNICATION ENGINEERING AND DEPARTMENT OF ELECTRICAL & ELECTRONIC ENGINEERING

Required to join a lively multidisciplinary group involved in:
(i) teaching undergraduates, including those on an MEng programme, and diploma students.
(ii) research and consultancy covering a wide range of activities as detailed by the subject areas given below.
Applicants should hold a first degree in engineering or related discipline; together with relevant industrial, teaching or research experience.

Lectureships in:

Digital Control

Computer Aided Design

Systems Design

Computer Vision Systems

Satellite Communications

Digital Communications

Software Engineering

LSI/VLSI System Design

Artificial Intelligence in Engineering

Computer Graphics and Image Processing

Research Assistantships in:

Software Design Tools

Active Tactile Sensors

Application forms to be returned by Friday 6th April, 1984 can be obtained, together with further particulars, from the Personnel Office, Plymouth PL4 8AA. Tel: Plymouth (0752) 284659.

(14349)

Plymouth Polytechnic

Bristol Polytechnic

Engineering Department

PRINCIPAL LECTURER IN COMPUTER AIDED DESIGN

Ref. No. L184

Bristol Polytechnic proposes to make a senior appointment in the Department of Engineering to a Principal Lecturer in Computer Aided Design. The successful candidate will be responsible for the design and development of a new degree scheme in Computer Aided Design, and will also be responsible for the teaching of this subject. The successful candidate will be expected to contribute to the development of the Department of Engineering, and to the development of the Polytechnic as a whole. Applications, with names and addresses of two referees, should be sent to the Personnel Office, Bristol Polytechnic, 100, The Quadrant, Bristol BS1 1QJ. Closing date: 5th April 1984.

Salary scale: £12,519-£15,744 p.a.

For further details and application forms, please apply to the Personnel Office, Bristol Polytechnic, 100, The Quadrant, Bristol BS1 1QJ. Tel: Bristol (0274) 21111.

(14384)

Polytechnic of the South Bank

Department of Building Economics

PRINCIPAL LECTURER IN QUANTITY SURVEYING

Ref. No. BSO1

The person appointed will be responsible for the design and development of a new degree scheme in Quantity Surveying, and will also be responsible for the teaching of this subject. The successful candidate will be expected to contribute to the development of the Department of Building Economics, and to the development of the Polytechnic as a whole. Applications, with names and addresses of two referees, should be sent to the Personnel Office, Polytechnic of the South Bank, 100, The Quadrant, London W1A 1QJ. Closing date: 5th April 1984.

Salary scale: £12,519-£15,744 p.a.

For further details and application forms, please apply to the Personnel Office, Polytechnic of the South Bank, 100, The Quadrant, London W1A 1QJ. Tel: London (01) 253 4111.

(14385)

Teesside Polytechnic

We are an 'Equal Opportunity Employer'

Department of Business and Professional Studies

LECTURER II IN ECONOMICS (INCLUDING QUANTITATIVE METHODS)

Ref. No. L180

Applications are invited for a post in economics with proven research and teaching experience. The successful candidate will be responsible for the design and development of a new degree scheme in Economics, and will also be responsible for the teaching of this subject. The successful candidate will be expected to contribute to the development of the Department of Business and Professional Studies, and to the development of the Polytechnic as a whole. Applications, with names and addresses of two referees, should be sent to the Personnel Office, Teesside Polytechnic, 100, The Quadrant, Middlesbrough TS1 3BA. Tel: Middlesbrough (01642) 21111.

Salary scale: £7,215-£13,443 p.a.

For further details and application forms, please apply to the Personnel Office, Teesside Polytechnic, 100, The Quadrant, Middlesbrough TS1 3BA. Tel: Middlesbrough (01642) 21111.

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(14386)



Use your teaching skills to train our young people so that they in turn may help to further develop our nation.

LECTURER: HISTORY (Med-Lab Technology)

Qualifications: Applicants should have an appropriate recognised diploma in Medical Laboratory Technology or a science degree specialising in Histology plus a minimum of three years of work experience in a large hospital. Teaching experience would be an advantage.

Duties: The successful candidate will be required to teach Histology to post-school certificate students preparing for a diploma in Medical Laboratory Technology.

LECTURER: PARASITOLOGY (Med-Lab Technology)

Qualifications: Applicants should have an appropriate recognised diploma in Medical Laboratory Technology or a science degree specialising in Parasitology. At least three years of work experience would be an asset.

Duties: The successful candidate will be required to teach a specialised course in Medical Laboratory Technology preparing students for a diploma in the field.

LECTURER: BACTERIOLOGY (Med-Lab Technology)

Qualifications: Applicants should have a recognised diploma in Medical Laboratory or a science degree specialising in Bacteriology. At least three years Med-Lab experience will be required.

Duties: The successful candidate will be required to teach students on a three year course leading to a Diploma in Medical Laboratory Technology.

LECTURER: PHARMACY (2 POSTS)

Qualifications: Applicants should have a University degree in Pharmacy or an equivalent diploma in Pharmacy Technology with at least three years of work experience in the field including the dispensing of drugs in a large hospital.

Duties: The successful candidates will be required to teach students on a three year course leading to a Diploma in Pharmacy Technology.

LECTURER: COMPUTER SCIENCE (2 POSTS)

Qualifications: Applicants should have an appropriate recognised qualification in Computer Science with several years of experience in Computer programming and at least two years experience as a Senior Programmer or Senior Systems Designer or Analyst.

Duties: The successful candidate will be required to teach Computer Science to full time students preparing for a three year diploma in Business Studies.

LECTURER: ACCOUNTANCY (2 POSTS)

Qualifications: Applicants should have a University degree or a recognised diploma in Business Administration or Commerce with a major in Accounting and preferably Auditing. A period of two years work experience as a teacher of the subject will be an asset.

Duties: The successful candidates will teach Accountancy to students preparing for a diploma in Business Studies.

LECTURER: JOURNALISM (3 POSTS)

Qualifications: Applicants should have a degree in the Liberal Arts or Social Sciences with a post-graduate degree or diploma in Journalism or Mass-Communication with at least three years of experience in Mass-Media. Candidates without a University degree who have served in Mass-Media for not less than four years may also apply.

Duties: The successful candidates will be required to teach students on a three year diploma course for the newspapers, magazines and information up to the level at which they are immediately acceptable to the employers.

LECTURER: PHYSIOTHERAPY (2 POSTS)

Qualifications: Applicants should have an appropriate recognised qualification in Physiotherapy and a minimum of three years practical experience. Teaching experience in this field would be a strong advantage.

Duties: The successful candidates will be expected to join a team of Lecturers preparing students partly at the College and partly at the University Hospital for a diploma in Physiotherapy.

LECTURER: RADIOGRAPHY

Qualifications: Applicants should have an appropriate recognised qualification in Radiography and a minimum of three years practical experience. Teaching experience would be an advantage.

Duties: The successful candidate will teach full time students on a three year course partly at the College and partly at the University Teaching Hospital leading to a diploma in Diagnostic Radiography.

LECTURER: HOTEL MANAGEMENT

Qualifications: Applicants should have a qualification or equivalent to HCIMA Chef examinations with at least three years of post training experience in Hotel Management or Institutional Catering.

Duties: The successful candidate will be expected to teach all aspects of Hotel Management and administration or Institutional Management to students on full time and block release courses leading to a diploma in Hotel Management.

LECTURER: COOKERY

Qualifications: Applicants should have a recognised qualification in Cookery with at least three years of post training experience in a Hotel or Restaurant. Teaching experience would be a strong advantage.

Duties: The successful candidate will be required to teach all aspects of Cookery in the Hotel and Restaurant area to full time and block release students.

LECTURER: ELECTRONICS ENGINEERING

Qualifications: Applicants should have a University degree in Electronics Engineering or HNC/HND or full City and Guilds technological diploma or equivalent in Telecommunications Engineering with not less than two years of Industrial experience. Teaching experience would be an advantage.

LECTURER: MINE SURVEYING

Qualifications: Applicants should have a University degree or a recognised National Diploma in Mine Surveying or equivalent with not less than three years practical experience in the field.

Duties: The successful candidate will be expected to teach Mine Surveying to full time students on a three year course leading to a Zambian Diploma in Mine Surveying.

LECTURER: PROCESS INSTRUMENTATION

Qualifications: Applicants should have a Chemical, Electrical or Mechanical degree qualification or a recognised National Diploma in process control. At least two years of Industrial experience will be required especially in the maintenance area. Teaching experience will be an asset.

Duties: The successful candidate will be expected to teach Process Instrumentation to full time students on a three year course leading to a Zambian Diploma in Process Instrumentation.

LECTURER: QUANTITY SURVEY TECHNOLOGY

Qualifications: Applicants should have a recognised National Diploma in Quantity Survey Technology with at least two years of Industrial experience. A teaching qualification or teaching experience would be a strong advantage as would be Membership of the Surveyors Professional Organisation.

Duties: The successful candidate will be expected to teach Quantity Survey Technology to full time students on a three year course leading to a Zambian Diploma in Quantity Survey Technology.

LECTURER: LAND SURVEY TECHNOLOGY

Qualifications: Applicants should have a degree or a recognised National Diploma in Land Survey Technology with at least two years of practical experience in the field. Membership of the Institute of Surveyors would be a strong advantage as would be any teaching experience.

Duties: The successful candidate will be expected to teach Land Survey Technology to full time students on a three year course leading to a Zambian Diploma in Land Survey Technology.

LECTURER: CIVIL ENGINEERING

Qualifications: Applicants should hold a degree in Civil Engineering or a National Diploma in Civil Engineering Technology with at least two years of Industrial experience. Teaching experience will be an advantage.

ZAMBIA AIR SERVICES TRAINING INSTITUTE

CHIEF GROUND INSTRUCTOR K10,176 - K12,576 p.a.

Qualifications: Applicants should have a Flight Navigator's commercial licence with many years of aircrew experience or a full Air Transport Pilot's Licence (ATPL) with at least 2000 flying hours. Previous experience on Ground School instructions would be an advantage or Category 'A' qualified Navigation Instructor credentials of any recognised Airforce with not less than seven years experience.

Duties: The successful candidate will be required to develop and coordinate academic instruction programmes given to pilots up to and including the level of commercial pilots licence with instruments and multi-engine ratings as well as full ATPL. He will advise on the organisation and administration of Ground School in relation to appropriate training and subsequent licensing.

SENIOR LECTURER: AERO- ELECTRONICS

Qualifications: Applicants should have a University degree in Electronics Engineering with a special option in Aero-Electronics with special emphasis on the semi-conductor theory and application. A minimum of four years proven experience will be required in Telecommunications preferably in Civil Aviation or Armed Forces in the installation of IIG VHF FSK fixed and mobile systems tape recorders and remote control systems experience in Air Navigation Aids like VOR, ILS, VDF, GCA and ND3 surveillance radar would be a strong advantage.

LECTURER: AIRCRAFT MAINTENANCE ENGINEERING

Qualifications: Applicants should have a University degree in Aeronautical Engineering or a recognised National Diploma in Aircraft Maintenance Engineering with not less than three years experience in Aircraft Maintenance Engineering as it affects Aero-Engines and Air Frames. Teaching experience would be an advantage.

FLYING INSTRUCTOR K6,660 - K8,760 p.a.

Qualifications: Applicants should have a valid Commercial Pilot's Licence with full instructors and instrument ratings. Applicants who are approved National Examiners for the issue of Pilot's Licences and Instrument ratings have an advantage. Applicants should have extensive experience as Flying Instructors at nationally approved training establishments and should have not less than 1,500 flying hours of which 500 will be of Flying Instruction. Candidates with CESSNA 150/170 in Group 1 and flying experience in Tropics at high altitude air fields have an added advantage.

You will also enjoy low cost accommodation, low taxation and free air passages for yourself and immediate family.

For further information, please send full personal/professional details (in total confidence and without obligation) to: Recruitment Officer, Zambia High Commission, 2 Palace Gate, Kensington, London W8.

Salaries and Benefits:
Senior Lecturer: K7008 - K7824 Lecturer: K4764 - K7416
Some of these vacancies may attract supplements paid for by the British Government at rates ranging from £5112 p.a. for a single Lecturer to £9900 p.a. for a married Lecturer to £14058 p.a. for either a single or married Head of Department.

Overseas continued

FEDERAL UNIVERSITY OF TECHNOLOGY MAKURDI NIGERIA

Applications are invited from suitably qualified candidates for the following vacancies in the School of Pharmacy:

Senior Lecturer I and II in Pharmacology/Pharmaceutical Microbiology.

Professor, Associate Professor, Senior Lecturer I and II in Pharmaceutical Technology/Industrial Pharmacy.

Senior Lecturer, Lecturer I and II in Pharmacognosy/Medicinal Chemistry.

Senior Lecturer, Lecturer I and II in Pharmacology.

Senior Lecturer, Lecturer I and II, Assistant Lecturer (*Nigerian candidates only) in Pharmaceutical Chemistry.

SALARY SCALE
Professor US\$ 15 N14,280-N15,720 p.a.
Associate Professor US\$ 14 N12,732-N15,372
Senior Lecturer US\$ 13(a) N11,384-N14,820
Lecturer I US\$ 11 N 9,000-N10,080
Lecturer II US\$ 9 N 7,550-N 8,040
Assistant Lecturer US\$ 8 N 6,338-N 7,488

Note: 1 Naira = .94p approximately.

CONDITIONS OF SERVICE
Appointment to retiring age, subject to a probationary period or in case of expatriates on a two-year contract basis, renewable by mutual consent. Fringe benefits include air passages, subsidised housing, leave allowance, car allowance, free medical/dental treatment.

METHOD OF APPLICATION
Typewritten application (six copies) should include curriculum vitae stating full name, nationality, place and date of birth, home address, present postal address, marital status, number and age of children, education including dates and institutions attended, academic and professional qualifications with dates, details of posts held with dates, publications with names of journals, etc, extra curricular activities, names and addresses of three professional referees to be sent to:

The Director
Nigerian Universities Office,
180 Tottenham Court Road, London W1P 0LE
by 6th April, 1984.

Candidates are requested to ask their referees to send their references to the above.

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UNIVERSITY OF TRANSKEI

Applications are invited from suitably qualified persons regardless of sex, religion, race, colour or national origin, for appointment to the following posts:

1. ASSOCIATE PROFESSOR/SENIOR LECTURER: MATHEMATICS

MINIMUM QUALIFICATIONS: Applicants for the senior post should have a Ph.D degree or the equivalent in research experience.
CLOSING DATE FOR APPLICATIONS: 31st March, 1984.
ASSUMPTION OF DUTY: 1st July, 1984 or as soon as possible thereafter.

2. LECTURER/JUNIOR LECTURER; MATHEMATICS

MINIMUM QUALIFICATIONS: Applicants for the post should have a Ph.D degree.
CLOSING DATE FOR APPLICATIONS: 31st March, 1984.
ASSUMPTION OF DUTY: 1st July, 1984 or as soon as possible thereafter.

SALARY SCALES:
Associate Professor - R21 237 x 936 - 24,046 x 1,036 - 28,116 plus 12%
Senior Lecturer - R16 657 x 936 - 24,046 plus 12%
Lecturer - R12 657 x 780 - 16,557 x 936 - 22,173 plus 12%
Junior Lecturer - R9 075 x 621 - 10,317 x 780 - 14,217 plus 12%

Additional benefits include payment of removal of furniture and personal effects, assistance towards University education of children, accident insurance cover, study leave, leave gratuity on retirement and membership of Group Insurance, Pension and Medical Schemes.

UNIVERSITY OF MALAWI

STAFF VACANCIES: BUNDA COLLEGE OF AGRICULTURE

Applications are invited from suitably qualified candidates for the following posts tenable from September/October 1984 at Bunda College of Agriculture, a constituent College of the University of Malawi.

DEPARTMENT OF CROP PRODUCTION

Lecturer/Senior Lecturer in Plant Breeding

The successful applicant will be required to teach Plant Breeding and Crop Improvement in a programme leading to the award of the 3-year Diploma and the 5-year Degree in Agriculture.

Candidates should have a good Honours Degree in Agriculture, Genetics, or Botany, and a postgraduate qualification in Plant Breeding, as well as teaching and/or practical experience, and should be able to undertake and supervise some research.

DEPARTMENT OF AGRICULTURAL ENGINEERING

Lecturer/Senior Lecturer in Agricultural Engineering (2 posts)

Successful applicants will be required to teach at least two of the following subjects to 3-year Diploma and 5-year Degree students: (1) Mathematics, (2) Physics, (3) Processing, and (4) Farm Structures.

Candidates must possess a good Honours Degree and a postgraduate qualification in Agricultural Engineering (or relevant areas), with a strong background in either Farm Structures or Processing, as well as teaching and/or practical experience, and should be able to undertake and supervise some research.

DEPARTMENT OF HOME ECONOMICS/NUTRITION

Lecturer/Senior Lecturer in Human Growth & Development

Family Resource Management or Home Economics Extension. The successful applicant will be required to teach two or more of the following courses to 3-year Diploma and 5-year Degree students: (1) Human Growth & Development, (2) Community Services, (3) Home Management, (4) Professional Home Economics, (5) The Family and its Environment, and (6) Home Economics Education/Extension.

Candidates must possess a good Honours Degree and a postgraduate qualification, as well as teaching and/or practical experience in one or more of the required specialities, and should be able to undertake and supervise some research.

Lecturer in Food Science

The successful applicant will be required to teach Food Science as well as Family Food and Food Management to 3-year Diploma and 5-year Degree students.

Candidates must possess a good Honours Degree and a postgraduate qualification, as well as teaching and/or practical experience, and should be able to undertake and supervise some research.

Competitive salaries (currently under revision) will be offered to successful candidates. Part-furnished accommodation will be provided at 10% basic salary, as well as the usual benefits for those employed on contracts (initially, two years), including air passages, medical expenses, educational allowances, and tax-free gratuity.

Four copies of a detailed curriculum vitae containing full particulars of qualifications and experience, plus the names and addresses of three referees, should be sent to the Registrar, University of Malawi, P.O. Box 278, Zomba, by 24th March, 1984.

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AUSTRALIA

ROYAL MELBOURNE INSTITUTE OF TECHNOLOGY LIMITED

DEPARTMENT OF CIVIL AND AERONAUTICAL ENGINEERING

Applications are invited for the position of Lecturer in Civil Engineering. Applicants should have a higher degree and relevant experience. Expertise in one of the following fields is required: Water Resources or Public Health Engineering, Geotechnical Engineering, Transport Engineering, Municipal Engineering. This is a tenured appointment.

A representative of RMIT will be in London from 21st to 26th April. Please indicate in writing availability for initial interview during these dates.

Salary within the range \$A23,394 - \$A30,734 p.a.

A position description should be obtained from the Staff Branch - (03) 341 2337. Applications quoting Ref. No. 111/10/AN to the Staff Officer, RMIT, GPO Box 2476/V, Melbourne, 3001 Victoria, Australia by April 13th, 1984.

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McMaster University Canada

GEOTECHNICAL ENGINEERING

The Department of Civil Engineering and Engineering Mechanics at McMaster University will be making a tenure track appointment in the Geotechnical Engineering field of the Assistant Professor level effective July 1, 1984 or as soon as feasible thereafter.

Applicants should hold the PhD degree. The successful applicant will be expected to participate in undergraduate and graduate teaching and also conduct research in his field of specialization.

Applicants should be sent as soon as possible to the Department of Civil Engineering and Engineering Mechanics, McMaster University, Hamilton, Ontario, L8S 4L7.

PLEASE MENTION THE T.H.E.S.

when
replying to
advertisements

Colleges of Higher Education continued

Applications are invited from persons with appropriate graduate and professional qualifications to teach on

MARITIME AND INTERNATIONAL LAW

on a wide range of courses at undergraduate and postgraduate levels in Fisheries and Maritime Studies, including aspects of port and shipping management.

Salary scales:
SL \$10,653-\$12,652
(SL \$13,443)
LI \$7,216-\$11,568.
Further details and application forms may be obtained from the Personnel Office, Engineering Avenue, Hull HU6 7LU, Tel: (0482) 448500.
Closing date: 30th March 1984.

HUMBERSIDE COLLEGE of Higher Education

The Times Higher Education Supplement

Special Book Numbers

March	9	Education (I)
	16	Maths & Physics (I)
	23	Economics (I)
	30	History (I)
April	6	Biology Sciences (I)
	27	Sociology (I)
May	4	English
	11	Chemistry
	18	Philosophy
	23	Engineering
June	1	Law
	8	Psychology (I)
Sept	28	Education (II)
Oct	5	Economics (II)
	12	Environmental Sciences (II)
	19	Sociology (II)
	26	Maths & Physics (II)
Nov	2	History (II)
	9	Psychology (II)
	16	Politics
	23	Biological Sciences (II)
Dec	7	Computer Science